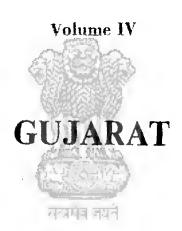
# NATIONAL COMMISSION ON AGRICULTURE 1976

### RAINFALL AND CROPPING PATTERNS





GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND IRRIGATION
NEW DELHI

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### RAINFALL AND CROPPING PATTERNS—STATE SERIES

VOLUME STATE

No.

I ANDHRA PRADESH

II ASSAM

III BIHAR

IV GUJARAT

V HARYANA

VI HIMACHAL PRADESH

VII JAMMU & KASHMIR

VIII KERALA

1X MADHYA PRADESH

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### RAINFALL AND CROPPING PATTERNS

### **GUJARAT**

### INTRODUCTION

- The human population of the country is estimated to rise from the 1971 Census figure of 548 million to 935 million in 2000 AD. This rise calls for increased production. Land resources being limited emphasis has to be placed on increasing productivity per unit area. Temperature and other climatic conditions being favourable for crop production throughout the year over most parts of the country, it is possible to grow more than one crop in a year provided water, the most important input, is available. In some parts of the country, the rainy season is long enough to provide scope for double cropping. This potential is yet to be fully exploited. There is scope for increasing irrigation resources in the country, but our estimates show that the area under irrigation is not expected to be more than 42 per cent of the total cropped area even in 2000 AD as against 22 per cent in 1970-71. Therefore, judicious utilisation of direct rainfall and irrigation water, singly and in combination, will have to be thought of for increasing production.
- 1.2 Farming technology has so advanced that it is possible to increase crop yields even under rainfed conditions, but the choice of crops would have to depend upon the amount and distribution of the prevailing rainfall. Additionally, it will be necessary that the maximum possible quantity of rain water is conserved in ponds and pools situated either within the farm area or elsewhere, in soil profiles and underground storages so that the same could be readily used to save crops in times of water stress. Not only in rainfed farming but even under irrigated conditions, one will have to plan for the most economic and efficient use of water so as to derive maximum possible benefit from rainfall and reduce dependence on irrigation. This necessitates a close study of the existing
- cropping patterns vis-a-vis rainfall patterns aimed at determining the nature of changes needed in the former. The cropping patterns depend primarily on the soil and climatic factors but the evolution of a cropping pattern in course of time is the combined effect of soil, climate, food habits and requirements and economic factors. In the context of increasing production, it is necessary to examine the cropping patterns from a scientific angle and find out possible alternative patterns having higher potential. Accordingly, the Commission undertook a comprehensive study of the rainfall and cropping patterns of the country using taluk or tehsil as unit of area. It covered several other relevant factors such as orography, land use data, human and livestock populations, soil and climate, the object being to make, as far as possible, an integrated assessment.
- 1.3 Chapter 14 on Rainfall and Cropping Patterns of the Commission's Report presents a consolidated account of the data collected together with analysis of their inter-relationships on all-India basis. In this analysis the Commission has been greatly benefited by the discussions with the concerned officers of State Governments. It was realised that by condensing the vast amount of information collected from each State into the small space of a chapter, many important and peculiar features of individual States were likely to be missed and hence the data and analysis of each State have been presented in separate volumes. The manner of presentation is similar to Chapter 14. It has also been considered desirable to include in each State volume the methodology and suggestions for future cropping patterns, which are practically the same as given in Chapter 14.

### 2 METHODOLOGY

2.1 The chief features of the study are (a) use of taluk or teshil as unit of area for all basic data and analysis, (b) introduction of coded numerical forms to express patterns of distribution of monthly rainfall throughout the year, crops and livestock; (c) inclusion of information on orography, temperature, evapotranspiration, rainfall, soil, irrigation, land use, human and livestock populations and yield performance of crops, all of which influence in different ways and degrees the cropping patterns of a place and (d) presentation of coded information on rainfall, crops and livestock on 1:1 million scale maps.

### Rainfall Patterns

2.2 A major feature of Indian rainfall is that the southwest monsoon season (June to September) accounts for 70 to 95 per cent of the annual rainfall throughout the country except in the south east peninsula and Kashmir and adjoining hill areas. The monsoon as well as the annual rainfall show large fluctuations from year to your but, as stated in Chapter 13 on Climate and Agriculture, there is no significant evidence of any trend or periodicity in either of them. Considered in relation to crop production, the total

annual or seasonal rainfall does not have much significance and what is important is its distribution during the period of growth of different crops. A relevant question, therefore, is whether rainfall should be examined on a weekly, fortnightly or monthly basis. The coefficient of variation (CV) of monthly rainfall is as high as 40-50 per cent even in the rainiest month of July over most of the central, northern and eastern India. In the south excluding the west coast, CV is higher and varies from 60 to 100 per cent. The variability of weekly or fortnightly rainfall being still greater, makes the use of either of them undependable as indicators of rainfall distribution. For a macrostudy like the present, monthly rainfall data which are more dependable and also the most convenient to handle have been used.

- 2.3 In order to relate crop production with rainfall, certain norms have to be assumed depending on the duration of the crops and their water requirements. On the basis of available information and the fact that most crops mature in about 90 days, the following broad norms have been drawn up:
  - (i) Rainfall greater than 30 cm per month (cm pm) for at least three consecutive months would be suitable for a crop like paddy whose water need is very high.
  - (ii) 20-30 cm pm for not less than three consecutive months would be suitable for crops whose water need is high but less than that of paddy for example, maize and blackgrain.
  - (iii) 10-20 cm pm for at least three consecutive months would be suitable for crops requiring much less water, e.g., bajra and small millets.
  - (iv) 5-10 cm pm for three consecutive months would be just sufficient for crops which have low water requirements, e.g., month (P. aconitifolius) and ephemeral grasses.
  - (v) Rainfall less than 5 cm pm for three consecutive months is not of much significance for erop production.
- 2.4 For denoting the year's rainfall distribution using monthly totals, a convenient code in letter symbols with numerical subscripts explained below, has been evolved. The letters A to E in Table 1 indicate the ranges of monthly rainfall and the subscripts to these refer to the number of months having these ranges of rainfall e.g. A indicates two months with rainfall greater than 30 cm pm. The ranges correspond to those stated in the preceding paragraph.

TABLE 1

Code for Rainfall Data

Symbol	Monthly rainfall cm pm
A- -	Greater than 30
В	2030
C	10-20
D*	5—10
E*	Less than 5

- 4-An examination of monthly rainfall in the country shows that except for areas in the west coast and some hill stations in extreme north-east, normal monthly rainfall scldom exceeds 40 cm.
- \*In distributions containing ranges of rainfall covered by A or B termed briefly as A & B types amounts less than 10 cm are not so significant and their frequency is generally small. To reduce the number of combinations, D is omitted in A or B type distributions; instead E is used to denote less than 10 cm pm. Thus B<sub>2</sub> E<sub>2</sub> would denote two months of 20-30 cm pm and two months less than 10 cm pm rainfall.

The southwest monsoon months of June to September being the principal rainy season dominate the rainfall distributions of the country. To indicate the season's importance, monthly rainfall distribution during June to September is shown in brackets in the annual pattern. To the right of the bracket is the distribution for the post-monsoon months, namely, October to January and to the left that for the pre-monsoon months namely, February to May. In order to explain how such a coded rainfall distribution written in symbols with numerical subscripts has to be interpreted, a hypothetical example may be considered  $D_1$   $E_3$   $(A_2$   $B_1$   $C_1$ )  $C_1$   $D_2$ , in which for each of the three periods, the symbols are in order of decreasing rainfall which is not necessarily the calendar sequence can be explained as under:

- (i) D<sub>1</sub> E<sub>3</sub> represents the period February to May in which one month's rainfall (usually May) is in the range of 5-10 cm and the remaining three months get less than 5 cm pm.
- (ii) A<sub>2</sub> B<sub>1</sub> C<sub>1</sub> represents the period June to September, in which two months (usually July and August) get more than 30 em pm rainfall, one month (September) gets 20-30 em and the remaining months, i.e. June gets 10-20 cm.
- (iii) C<sub>1</sub> D<sub>3</sub> represents the period October to January in which October gets 10-20 em rainfall and the rest 5-10 cm pm.

### Boundaries of Rainfall Zones

2.5 Since differences in monthly, seasonal and annual rainfall are not large within short distances, linear interpolation of rainfall data is permissible. Rainfall data being point measurements, isolines for the same or nearly the same type of distribution of monthly rainfall can, therefore, be drawn. These isolines may not necessarily follow the boundaries of taluks which

are taken to be unit of area in this study and hence for delineation of boundaries the following procedures has been adopted:

- (i) Where variations are small, isolines follow the taluk boundaries;
- (ii) where variations are large, isolines delineate the zone boundaries; and
- (iii) any taluk, more than three quarters of which lies outside of zone is not considered a part of that zone.
- 2.6 If an identical distributoin is observed over two or more adjacent taluks a pattern is said to have evolved and the area covered by it is distinguished as a zone and indicated suitably by a Roman numeral. Rainfall patterns have been identified for the whole country using the methodology described above. The data used for the analysis are the monthly normals of rainfall (1901 to 1950)' and the patterns and zones are depicted on all-India map which forms part of Chapter 14 on Ranifall and Cropping Patterns of the Commission's Report.

### Cropping Patterns

- The basic data for the study of cropping patterns of the country are the areas under different crops in each of the taluks. A large number of crops are grown in a taluk but most of them occupy small areas, often less than one per cent of the total cropped areas of the taluk. With a view to limiting the number of crops constituting a pattern only those crops are considered which individually occupy 10 per cent or more of the gross cropped area of the taluk. In this process, several crops have to be excluded, even though they may be otherwise important. The minimum limit has been fixed at 70 per cent, so that the number of crops, which together cover at least 70 per cent of the gross cropped area, and in which none occupies less than 10 per cent, is not large. Trial computations have shown that in such distributions any crop occupying more than 10 per cent area is rarely omitted and the number of crops hardly exceeds five. When the same distribution holds good for two or more adjacent taluks, a pattern is obtained.
- 2.8 As in the case of rainfall, percentage area coverage by crops is expressed by means of numerical subscripts affixed to crop symbols shown in Table 2. The list of crops given below is comprehensive and will hold good for all the States.

TABLE 2
Crop Symbols and Area Intervals

	Crop	Symbol
1	rice	Pd
2	wheat	W
3	jowar (kharif)	Jk
4	jowar (rabi)	$J_{r}$
5	bajra	В
6	maize	M
7	ragi	R
8	small millets	Μŧ
9	barley	Ba

TABLE 2 (Contd.)

	Crop	Symbo
10	oats	Oa
П	gram .	G
12	pigeonpea (tur)	T
13	pulses other than pigeonpea and gram	Pu
14	groundnut	Gn
15	oilseeds other than groundnut	O
16	cotton	C
17	jute	u
18	other fibres	Fb
19	sugarcane	S
20	potato	Pt
21	vegetables	V
22	fruits	$F_{r}$
23	tapioca	Ta
24	plantations	L
25	fodder	F
26	chillies	Ch
27	tobacco	То
	Area Interval (per cent)	Subscript
	70 or more.	1
2	50-70	2
	30—50	3
	1030	4
. 7	less than 10	5

The crop code contains the crop symbol and the appropriate subscript. In writing crop distribution, the first crop has always the highest area but the rest may not necessarily follow the order of decreasing areas. For example, crop distribution, C<sub>3</sub> Jr<sub>4</sub> Mt<sub>4</sub>, means that cotton area is 30-50 per cent, and jowar rabi and millets each occupies 10-30 per cent of the gross cropped area, the total being 70 per cent or more. Two or more taluks having the same distribution of crops constitute a pattern. Cropping patterns so derived have been indicated on maps of 1:1 million size.

### Relative Yield Index of Crops

2.9 Besides the absolute figures, the yield of a crop has also been expressed as per cent of all-India average which is called Relative Yield Index (RY1). Relative Yield Index values have been computed for the principal crops on the basis of (1968-69 to 1970-71) data available in the records of the Directorate of Economics and Statistics, Ministry of Agriculture and Irrigation.

### Livestock Patterns

2.10 The livestock patterns are relevant only insofar as these are related to production of fodder and feeds. As talukwise data were not available for the livestock Census, 1972, those of 1966 Census as published by the States have been used. The animals considered for livestock analysis are shown in Table 3 together with their symbols.

<sup>1</sup> Memoirs of India Meteorological Department, VolumeXXI, Part 3, 1962.

TABLE 3 Livestock Symbols

Category	Symbol
cattle:	
male	Cm
(over 3 years)	Cf
female (over 3 years)	Ci
young stock	Су
(under 3 years)	•
buffaloes:	Th
male (over 3 years)	Bm
female	Bf
(over 3 years)	
young stock	Ву
(under 3 years)	S
sheep	
goats	G
horses, mules and ponies	H
donkeys	D
camels	Ca
pigs	P

The livestock patterns are expressed in coded form in the same manner as the cropping patterns.

2.11 Soil data on a taluk basis are not available for all the area of the county. As such, soils have been discussed in a general manner using the traditional nomenclature in describing their characteristics.

### Other Data

2.12 The sources of other data featuring in the study are given below:

item

taluk area

States' Census Reports 1971 or from the data furnished by the States in their land-use returns.

source

source item maps of the Survey of India and National Atlas Organiorography sation. Climatological Tables of Obtemperature servatorics in India, India Meteorological Department, 1931—1960 normals. scientific Report No. 136 of evapotranspiration the India Meteorological Department, 1971. Census of India, 1971. human population irrigation and land use basic data pertaining to land statistics utilisation statistics obtained from the States and refer mostly to 1969-70.

### Presentation of Information

2.13 The tables required for following the text are given in the text itself at appropriate places, whereas the basic data are appended as follows:

APPENDIX 1	Talukwise Land Use (1968-69 and population Statistics,) (arranged according to State rainfall zones).
APPENDIX 2	Talukwise Livestock Popula tion—1966 (arranged accor- ding to State rainfall zones).
APPENDIX 3	Zonewise information on Rainfall, Rainy days and Cropping Patterns.
APPENDIX 4	Zonewise area under Principal Crops—1968-69.

2.14 Rainfall, cropping and livestock patterns of each State are indicated on maps in the 1:1 million scale and given in Appendices 5, 6 and 7 respectively. In the case of rainfall patterns, the zonal numbers in State maps have been given in Roman numerals and their all-India equivalents as used in Chapter 14 of the Commission's Report have been shown in three digit Arabic numerals within brackets,

### 3 GENERAL FEATURES ...

The area of Gujarat State is 1.96 lakh sq km spread over 19 districts. The smaller districts of Gandhinagar and Dangs have areas of 649 sq km and 1683 sq km respectively. Kutch district has the largest area of 45,612 sq km which is 23 per cent of the total area of the State. Areawise distribution of the districts is given below:

4001-6001-8001-Area (sq km) 1-1000 1001-2000 2001-4000 6000 8000 10,000 5 no. of districts 10.001- 12.001- 14,001- Above 16,000 12,000 14,000 16,000 area (sq km) 1 no. of distficts 1

The State has 184 taluks. Average area of a taluk is 1,065 sq km.

### Elevation

3.2 Rann of Kutch is a low lying area. In the rest of the districts, the heights range between sea-level and 100 masl (metres above sea-level) excepting a small patch of area in Bhui and Nakhatrana, where the maximum heights are 300 to 400 masl. The central region is between 100 to 300 masl high except for

a few isolated peaks in Junagadh where the maximum elevation is 1,117 masl followed by Bhanvad with 637 masl. Bhesan 600 masl and Palitana 500 masl. In the rest of the area, the heights vary between sealevel and 200 masl. In Gujarat region the eastern boundary has a general maximum elevation of 300 to 400 masl. In Dangs, elevations range between 300 and 1.053 masl and in Bansa-Bharampur area the maximum elevation is 680 masl. Palanpur in Banaskantha has a maximum elevation of 1,090 masl.

### Population

The total population of Gujarat State is 26.7 million and the average population density 136 per sq. km. Seventy-two per cent of the population is rural. The population density in districts ranges from 19 in Kutch to 341 in Kheda. Three districts of Gandhinagar, Ahmedabad and Kheda have a population density of more than 300. The number of taluks in different ranges of population in each of the districts is given in Table 4. Ahmedabad, a city taluk, has the highest population density of 6,289 per sq. km. followed by Chorasi (Surat) with a density of 1,108 and Vadodara of 993.

TABLE 4
Talukas in different Ranges of Population Density

District	A	Number		No. of	Taluks with po	pulation densi	ity (per sq km)	of
District	Average density	of taluks	50	51-100	101-150	151-200	201-300	300
Saurashtra								
Jamnagar	79	10	<del></del>	. 7	2		1	
Rajkot	145	13		7	2	2	1	1
Surendranagar	81	9		7	1		1	
Bhavnagar	126	12		1	8	2	1	
Amreli	126	10		3	5	1	1	
Junagadh	156	15		2	5	5	3	
Kutch	19	9	6	2	1		-	
Gujarat								
Banaskantha	100	11	1	4	4	2	-	
Sabarkantha	161	10		100	3	5	1	
Mehsana	232	11	<b>₹</b>	_ 1 % 11	1	1	3	5
Gandhinagar	309	1		-		_	-	1
Ahmedabad	334	7	1 1	1	3	_	2	1
Kheda	341	10		141	•	1	4	5
Panchmahals	209	11		The state of	1	6	4	
Vadodara	254	12		345	2	6	2	2
Bharuch	123	11	रुखिएं	2	6	1	1	1
Surat	231	13	.1 4.4	4 -14-1	2	5	4	2
Valsad	273	8	-	-	1	g*west	1	6
Dangs	56	1		1			_	
State	136	184	7	39	47	37	30	24
Saurashtra region		69	_	27	23	10	8	1
Kutch region		9	6	2	1	-		-
Gujarat region		106	1	10	23	27	22	23

### Land Use

3.4 Districtwise land use statistics is given in Table 5. The area under forests is about 9 per cent of the geographical area of the State. Dangs district has the highest area of 70 per cent under forests followed by Panchmahals, Valsad, Surat, and Broach with 20 to 26 per cent, Junagadh with 18 and Banaskantha with 11 per cent. Elsewhere in the State, forest area is negligible. Nearly 73 per cent of the geographical area of Kutch district, 15-20 per cent of Surendranagar and Jamnagar districts, 10-15 per cent each in Sabar-2-737 Agri/76

kantha Rajkot and Ahmedabad comes under barren and uncultivable land. Elsewhere such area is negligible. Fallow lands are generally negligible. Permanent pastures and other grazing lands cover 5 to 10 per cent area in Saurashtra. Kutch has the lowest net sown area of 10 per cent and Dangs comes next with 20 per cent but in the remaining parts of the State net sown area exceeds 50 per cent. In six of the districts net sown area is about 70 per cent or more of the total reporting area. Area sown more than once in this State is 6 per cent only of net sown area (1969-70).

TABLE 5
Districtwise Land Use Statistics—1969-70

(Percentage of reporting area)

District	Forest	Barren & uncultivabl waste		Cultiva- ble waste	Permanent pastures & other grazing land	Land under misc. trees crops and groves	Current fallows	Other fallow	Net sown area
Dangs Valsad Surat Broach Baroda Kheda Panch Mahals Sabarkantha Banaskantha Mehsana . Ahmedabad Gandhinagar Surendranagar Bhavnagar Rajkot . Amreli . Junagadh .	69·7 25·6 23·2 20·6 8·8 2·7 26·5 8·8 10·8 2·4 0·2 1·3 3·2 4·3 17·9	3 · 6 4 · 9 2 · 4 3 · 6 4 · 4 2 · 9 3 · 6 12 · 4 4 · 9 0 · 6 10 · 8 4 · 0 16 · 0 7 · 0 10 · 6 2 · 8 15 · 4	1 ·6 1 ·7 2 ·5 6 ·6 5 ·0 11 ·0 3 ·4 1 ·6 2 ·2 4 ·2 4 ·4 3 ·2 4 ·3 4 ·7 4 ·6 4 ·3 4 ·2	1.0 3.9 1.9 4.6 1.9 1.1 3.3 3.8 2.4 5.0 3.4 3.7 1.7 1.8 1.0	0·2 3·5 5·4 3·9 4·0 5·1 4·3 5·9 8·3 2·8 8·9 9·8 7·2 13·2 7·4	0·6 0·3 	3·4 1·7 1·2 0·6 0·8 1·4 3·1 4·2 11·4 2·9 2·5 3·4 2·8 5·9 2·1 3·5	0·8 1·0 1·3 2·3 0·4 0·6 0·6 2·0 1·0 0·7 2·8 0·8 3·7 3·1 1·2 1·7 0·7 3·9	19·7 57·7 61·5 58·3 69·5 76·3 54·4 62·9 61·0 75·5 71·1 78·5 65·3 63·0 66·4 73·3 57·6

#### Soils

In Kutch, saline and alkaline soils cover the area to the north of Lat. 23½°N. A narrow strip below this consists of red and brown soils. In the rest of the district, black soils prevail deep in the western half and medium elsewhere except for a narrow strip in the east with grey brown soils. In Saurashtra, Jamnagar coastal strip has saline and alkaline soils and coastal alluvium elsewhere along the coast. Rest of Amrel and Bhavnagar districts has deep black soils. Rajkot and Jamnagar (excluding coast) and southern portion of Junagadh have mainly medium black soils. North eastern part of Junagadh has mixed red and black soils. Surendranagar district has grey brown soils and this belt extends to Banaskantha in the north and Kaira in the east. Kaira, Ahmedabad, Mehsana and eastern half of Banaskantha districts form a continuous area with Surendranagar district and adjoining eastern portion of Kutch, which have grey brown soils. The remaining part of the region has black soils. These are deep black in Surat, Broach and adjoining Baroda or Vadodara. In the rest of the area the soils are medium black. Desert soils are appearing in the western half of Banaskantha district.

### Rainfall

3.6 The annual rainfall in the State varies widely from less than 30 cm in the western half of Kutch to more than 150 cm in the southern most districts of Bulsar (Valsad) and Dang. A major feature is that 95 per cent of the total annual rainfall occurs during June to September. July is the month of maximum rainfall accounting for 40 per cent of annual rainfall followed by August with 25 per cent. Kutch area is the zone of lowest rainfall which ranges from 26 to 40 cm, July getting about 15 cm followed by August with 8 cm. In Saurashtra region, rainfall varies from less than 40 cm to 100 cm with a zonal average of 60 cm. Junagadh district has the heaviest rainfall of 100 cm

and Okhmanal area less than 40 cm. In northern and eastern districts, rainfall varies from 50 to 97 cm. Mehsana and Banaskantha districts are in the low rainfall zone with averages of 50 to 55 cm and Idar has the maximum with 97 cm. In southern districts, the rainfall varies from 78 cm in Kheda to 173 cm in Valsad.

3.7 In June, coefficient of variation (CV) of rainfall exceeds 80 over Kutch and most of Saurashtra and CV values of July are reduced to 50 to 60 in Gujarat region and 60 to 80 in Saurashtra. CV in August increases to 60 to 80 over Gujarat region and western half of Saurashtra and exceeds 80 in the rest of the area. In September, CV exceeds 80 in Gujarat region and it is above 100 in the rest of the Statc. Seasonal variability continue to be high. CV ranges between 30 and 40 in Gujarat region and more than 40 elsewhere. CV exceeds 60 in western half of Kutch. Saurashtra and Kutch are areas of high variability with large variations in rainfall from year to year. Gujarat region with higher rainfall is better but CV continues to be high.

### Temperature

3.8 Monthly and annual normal maximum, minimum and daily mean temperatures for 13 observatory stations in Gujarat are given in Tables 6-8. There is large unformity in mean daily temperature during July to September. The variation in the whole State is mostly less than 2°C (27°—29°C). This is nearly so even during October. Between July and August the variations are small and generally less than 1.5°C.

### Potential Evapotranspiration (PE)

3.9 Evapotranspiration data are given in Table 9. Saurashtra and Kutch region have high values of PE exceeding 180 cm annually. Rajkot area has PE exceeding 200 cm.

 $\begin{tabular}{ll} TABLE~6 \\ Normals~of~Daily~Maximum~Temperature~(^{\circ}C) \\ \end{tabular}$ 

Station	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Annual
Jamnagar	26 · 4	28 · 8	32 -9	35 • 5	36 · 1	35 •9	32 -3	31 · 5	31 .9	34 ·4	31 · 3	27 .8	31 ·2
Dwarka	25 •4	26 •4	28 •2	29 • 7	31 •2	31 •9	30 .2	29 · 3	29 .5	30 · 7	30 ⋅8	27 · 5	29 · 2
Rajkot	28 · 1	30 · 7	35.3	38 · 8	40 .5	37 ⋅8	32.6	31 .6	32 .9	35 · 4	33 - 2	29 · 6	33 -9
Bhavnagar	27 · 6	30 · 3	34 • 7	37 · 6	39 ·6	37 ⋅ 6	33 .2	32.3	33 .2	34 · 2	31 ·6	20 · 6	33 •4
Veraval	38 ·6	29 •2	31 · 1	31 • 5	31 · 1	31 · 3	29 - 5	28 -8	29 .6	32 ·8	32 -9	30 ·4	30 .6
Bhuj	26 · 1	29 ·1	34 .0	37 ⋅6	38 • 7	36 ⋅7	33 · 0	31 · 7	33 .2	35.6	32 · 3	28.0	33 .0
Surat	31 ·4	33 ·1	36 · 1	37 .3	36 .2	33 •7	30.5	30 -3	31 .6	35.5	34 .9	32 .8	33 · 6
Broach	31 •4	34 • 3	37 ·6	40 ⋅0	39 • 7	35 · 4	32.0	31 ·1	32 -7	35 9	35 -1	33.0	34 • 9
Baroda	30 · 1	32 •4	35 .6	39 •9	40 .7	37 • 2	32 • 4	41 •5	32 ⋅6	35.6	33 -4	31.0	34 ·4
Dohad	26 · 9	30 ⋅3	34 ∙9	38 •4	39 ·4	35 •9	30 •4	29 · 0	30 · 3	33 · 3	31 · 5	29 · 1	42 . 5
Ahmedabad	28 · 7	31 ⋅0	35.7	39 • 7	40 .7	38 ∙0	33 .2	31 .8	33 ·1	35.6	33 ·0	29 .6	34 •2
Deesa	27 -8	32 ·1	35 • 5	39 • 2	41 ·3	38 • 9	33 •4	32.2	33 ⋅0	35 · 7	33 · 1	29 .8	33 · 3
Radhanpur	27 · 6	30 .9	35 ⋅3	38 ⋅7	41 ·7	38 ⋅8	34 .2	32 - 1	33 .8	35.5	32 · 7	29 .0	34 .2
Dahanu	27 · 7	28 • 2	30 · 3	32.0	32 · 9	32 ·1	29 · 7	29 ·1	29 •6	31 · 7	31 -9	29 • 7	30 •4

TABLE 7

Normals of Daily Minimum Temperature (°C)

Station	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Annual
Jamnagar	10 .6	13 .0	17 -6	21 •4	25:4	27 ·1	26.2	25.4	23 -9	21 · 5	16.1	12.1	20.0
Dwarka	16 · 1	17 · 7	21 •5	24 . 7	27.0	28 -2	26.9	26.0	25.4	23 .9	20 .5	17 .0	22 .9
Rajkot	10.7	13 -1	17.2	21 .3	24 - 7.	26 .2	24.9	24.0	22 .9	20 .9	16.5	12.3	19.6
Bhavnagar	11 ·1	14 · 9	19 ·6	23 .9	26.0	27 ·1	26.0	24 · 8	24 .2	22 · 5	18.0	14 · 2	21.0
Veraval	14 -3	15 •4	18 · 4	22.0	25.9	27.6	26.2	25.5	24.6	22 · 3	18 -8	15.8	21 · 4
Bhuj	10 -1	12.9	18 · 3	22 .7	25.6	27.4	26.3	25.3	24 ·1	21 ·5	15.6	11 -2	20 · 1
Surat	14 ·8	16.4	20 ·1	23 .7	26 6	27 · 1	25.7	25 • 4	24 • 1	23 · 1	19 •2	16.0	21.9
Broach	12.8	14 •9	19 ·8	23 - 7	26.9	26.9	25 .7	25 · 1	24 .5	22 ·1	17 · 2	14 .0	21 ·1
Baroda	10 ·8	12.7	16.6	21 .7	26 1	27 1	25 .4	24 ·8	24 ·1	19 .9	14 · 3	11 4	19.6
Dohad	12 •1	14 · 5	19 · 3	24 .0	26.0	25.6	24 .0	23 .0	22 .6	20.0	15.3	12.7	19.9
Ahmedabad	11 ∙9	14 · 5	18.6	23.0	26 · 3	27 .4	25 .7	24 · 6	24 • 2	21 .2	16.1	12.6	20.5
Deesa	10 -4	12.2	17 •3	21.6	25.8	27.2	25.5	24 · 5	23 .5	19 · 3	14 .0	11 -1	19.4
Radhanpur	9 ·8	12 .7	16.9	21 •4	24 .8	26.3	24 · 4	24 0	24.0	19 • 3	15.1	11.1	19.1
Dahanu	16.8	17 • 5	21 .0	23 -9	26 8	26.4	25 -1	24 ·8	24 · 3	23 .0	20.0	17 .9	22.3

 $\label{eq:Table 8} \textbf{Normals of Daily Mean Temperature (°C)}$ 

Station	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Annual
Jamnagar	18 · 5	20 •9	25 · 3	28 ·5	30 ⋅8	31 •5	29 ·3	28 · 5	27.9	20 •0	24 -2	20 .0	26 ·1
Dwarka	20 ·8	22 · 1	24 • 9	27 • 2	29 ·1	30 ·1	28.6	27 · 7	27 · 5	27 · 3	25 .7	22 · 3	26 ·1
Rajkot	19 •4	21 •9	26 · 3	30 ·1	32 ·6	32 0	20.0	27.8	27 •9	28 ·2	24 .9	21 -0	26 -8
Bhavnagar	19 •4	22 •6	27 •2	30 .8	32 .8	32 •4	29.6	28 -6	28 .7	28 -4	24 .8	21 -4	27 ·2
Veraval	21 · 5	22 · 3	24 .8	26 ·8	28 · 5	29 • 5	27 •9	27 ·2	27 · 1	27 ·6	25 .9	23 -1	26.0
Bhuj	18 ·1	21 .0	26 • 2	30 •2	32 <b>·2</b>	32 ·1	29 •7	28 • 5	28 .7	28 .6	23 -9	19 ·6	26 <b>·6</b>
Surat	23 ·1	24 .8	28 •1	30 · 5	31 ·4	30 •4	28 ·1	27 •9	27 •9	29 ·3	27 ·1	24 •4	27 ·8
Broach	22 · 1	24 ·6	28 • 7	31 .9	33 • 3	31 •2	28 .9	28 · 1	28.6	29 .0	26 .2	23 - 5	28 .0
Baroda	20 · 5	22 · 6	26 ⋅6	30 ·8	33 •4	32 • 2	28 .9	28 -2	28 .4	27 .8	23 -9	21 •2	27 •0
Dohad	19 • 5	32 •4	27 · 1	31 •2	32.7	30 -8	27 -2	26.0	26 · 5	26 .7	23 ·4	20 .9	26 <b>·2</b>
Ahmedabad	20 · 3	22 .8	27 •2	31 •4	33 <b>·5</b>	32 ·7	29 - 5	28 •2	28 · 7	28 4	24 -6	21 •2	27 -4
Deesa	19 •1	22 · 2	26 •4	30 -4	33 •6	33 ·1	29 • 5	28 •4	28.3	27 · 5	23.6	20 · 5	26 .9
Radhanpur	18 • 7	21 .8	2 <b>6 ·1</b>	30 ·1	33 ·3	32 -6	29.3	28 · 1	29 ·9	27 · 4	23.9	20 ·1	26.7
Dahanu	22 •3	22 .9	25 · 7	28 ·0	29 •9	29 -3	27 -4	27 · 0	27 ·0	27 ·4	26 .0	23 •0	26 •4

Table 9

Normal Monthly and Annual Potential Evapotranspiration (PE)

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•	m	m	٠,
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1													
Station	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Annua
Gujarat region (in- ctuding Daman, Da- dra and Nagar Ha- veti)											- 100		
Radhanpur	84 •2	104 · 5	158 • 2	193 • 9	208 ·0	224 • 7	155 ·8	128.0	138 · 3	138 -0	98 ·8	77 ·6	1750 · 5
Ahmedabad	89 ·6	104 · 7	164 •4	197 · 7	234 ·8	490 •0	131 •0	116 • 7	133 ·7	139 ·6	99 •3	73 -9	1676 ·8
Baroda	82 ·2	97.6	144 •9	180 ·8	226 · 7	185 •0	120 ·1	114 · 1	124 ·1	129 • 9	92 ·9	76 •2	1574 •9
Broach	98 •4	115 · 3	167 · 1	200 ·3	237 •4	180 · 1	129 ·2	118 · 3	134 ·1	143 -7	109 ·3	93 •9	1727 ·8
Surat	99 •6	114 •9	162 •4	185 •7	202 •0	152 •4	190 • 2	107 • 9	114.6	141 ·5	116 · 2	99 •2	1606 •3
Saurashtra & Kutch (including Diu)	1												
Bhuj	92 •9	109 -9	162 ·8	2.09 •4	266 • 2	226.0	168 -0	153 ·8	160 •2	158 •0	107 · 5	81 ·8	1897 ·1
Jamnagar	93 ·1	106 •6	155 · 6	188 •8	224 • 9	191 -8	143 ·7	135 -9	133 •7	142 ·0	108 -9	86 •6	1714 -1
Dwarka	118 · 5	124 · 6	165 · 5	181 · 7	195 •7	-177 · l	141 .0	130 ·7	138 •0	150 •4	134 ·1	116 ·1	1773 -9
Rajkot	120 · 7	138 •4	205 · 7	249 ·4	302 4	239 •9	169 ·8	150 .0	154 ·4	168 · 6	131 ·1	113 ·6	2144 •6
Bhavnagar	99 •2	119 ·6	176 ·3	210 · 2	245 .4	198.8	145 · 6	134 •0	134 ·8	144 •0	112.2	94 •4	1815 -2
Vcraval	115 · 3	124 ·0	167 · 5	181 ·3	183 ·4	159 6	123 ·1	114 ·4	128 ·3	148 -9	126.0	113 · 2	1685 -5

### 4. RAINFALL ZONES, THEIR CROPPING AND LIVESTOCK PATTERNS

4.1 The State is divide into 14 rainfall zones. These are indicated below together with the number of taluks included in each and their total approximate area:—

Rainfall zone	Rainfall pattern	Reporting area Sq km	of
I	$E_4 (C_1D_1E_2) E_4$	21,605	11
11	$E_4 (C_1D_3) E_4$	5,796	8
111	$E_4 (C_2D_1E_1) E_4$	11,704	11
1V	$E_4$ ( $C_2D_2$ ) $E_4$	8,669	9
V	$E_4 (B_1 C_1 E_2) E_4$	36,913	41
VI	$E_4 (B_1 C_2 E_1) E_4$	16,729	17
VII	$E_4$ ( $B_2E_2$ ) $E_4$	4,231	4
VIII	$E_4 (B_2C_2) E_4$	5,054	6
1X	$E_4$ ( $A_1C_3$ ) $E_4$	9,844	16
X	$E_4 (A_1B_1 C_1E_1) E_4$	9,558	14
X1	$E_4 (A_1B_1 C_2) E_4$	15,950	23
XII	$E_4 (A_2B_1 C_1) E_4$	7,661	15
XIII	$E_4 (A_2B_2) E_4$	2,195	4
XIV	$E_4 (A_3 B_1) E_4$	4,632	5

### Rainfall Zone I-E<sub>4</sub> (C<sub>1</sub>D<sub>1</sub>E<sub>2</sub>) E<sub>4</sub>

4.2 The districts and taluks included in the zone along with the cropping patterns are given below:

	Taluk	District
{	Mundra	Kutch
ſ	Anjar	,,
	Abdasa	79
	Rapar	**
ł		**
		"
İ		"
¢		**
{	Okhamandal (dwarka)	Jamnagar
	{	Mundra Anjar Abdasa Rapar Bhachau Lakhpat Bhuj Mandvi Nakhatrana Okhamandal

4.3 This is the largest zone, covering onefourth of the total area of the State. It comprises Kutch district and two taluks of Jamnagar. The area of Kutch district is over 44,000 sq km. The population density of the zone is 50 per sq km, excepting Anjar and Okhamandal taluks which have a density of 109 and 107 respectively. Lakhapat taluk has the lowest density of 11.

- 4.4 The elevation of the zone is below 150 masl. In two taluks of Bhuj and Nakhatarana, however, the maximum elevation ranges from 300 to 400 masl. The coastal belt consists of coastal or deltaic alluvium soil. Deep or medium back soils and saline and alkaline soils predominate over rest of the area.
- 4.5 Details in respect of barren and uncultivable land are not available for taluk areas. But in Kutch district the barren and uncultivable lands account for 73 per cent of the geographical area. Fallow lands vary from a few per cent to 42 per cent in Abadasa. The net sown area is consequently very low. Net sown area is the lowest in Lakhpat being only 0.3 per cent but increases in Kutch to 11 per cent, in Bhuj to 17 and in Mandvi to 26, in Kalyanpur to 59 per cent and in Okhaniandal to 33 per cent.
- 4.6 The area irrigated is low but in a few taluks where the net sown area is itself extremely small, a sizeable portion is irrigated. In Mandvi 33 per cent of net sown area is irrigated and in Lakhatrana 28 per cent.
- 4.7 This is the zone of lowest annual rainfall in the whole State having an average of only 33 cm. The individual taluks receive between 25 to 45 cm rainfall. The month of maximum rainfall is July with an average of 15 cm and together with August, which is the next rainiest with 8 cm, accounts for about 70 per cent of annual total. The number of rainy days in these two months is 10. June and September get 3 to 4 cm. Rainfall in the other months hardly totals to even one cm and is negligible.
- 4.8 The cropped area of the zone is 617 thousand ha representing 6 per cent of the gross cropped area of the State, and the principal crops of the zone are bajra, jowar (kharif), fodder, other pulses, cotton and groundnut together occupying more than 90 per cent of the cropped area. This is the only zone which has a taluk with other pulses as dominant crop.
- 4.9 The yields of crops for Kutch and Jamnagar districts are given in Table 10. It will be seen that the yields of pulses and jowar are low being 31 and 19 to 25 per cent respectively of all-India average. Bajra yields are well above all-India being more than 120 per cent. Groundnut yield is normal. Cotton yields are good, being more than 150 per cent of all-India, which is higher than the State average of 144.
- 4.10 Goats and sheep are the largest in numbers in the zone. Goats constitute 25 per cent of total livestock population in most of the taluks of Kutch district but their average is 29 per cent for the entire zone. Male, female and young stock of cattle each range between 10 and 20 per cent. Female buffalocs and its yound stock are only a few per cent. Goats, sheep

and cattle together account for more than 80 per cent of livestock. The livestock patterns are:

Taluk		Livestock pattern
Lakhpat Nakhatrana	}	G <sub>3</sub> Cf <sub>4</sub> Cy <sub>4</sub>
Abdasa Bachhau Bhuj Mandvi	}	G <sub>4</sub> S <sub>3</sub> Cf <sub>4</sub>
Rapar		$\mathbb{S}_3/G_4/Cm_4/Cf_4$
Mundra Anjar Okhamandal Kalyanpur	}	S <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub> G <sub>4</sub> /Cy <sub>4</sub>

Table 10

Relative Yield Index of Principal Crops in Zone I

	Area '000 ha.	per eent of	RYI*		
	000 114.	gross crop- ped area	District Kutch	District Jamnagar	
Jowar (kharif)	86	14 · 3	19	25	
bajra .	107	17 ·8	127	121	
wheat	12	1 .9	113	112	
pulses	80	13	31	_	
groundnut	36	6	106	77	
cotton	45	7 · 5	177	155	

<sup>\*</sup>RYI or Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 & 1970-71.

### Rainfall Zone II— $E_4(C_1 D_3) E_4$

4.11 The districts and taluks included in the zone alongwith their cropping patterns are given below:

Cropping Pattern		Taluk	Dictrict
$Gn_3$ $B_4$ $Jk_4/C_4$		Liliya Lathi	Am <sub>1</sub> eli
Gn <sub>2</sub> B <sub>4</sub> /Jk <sub>4</sub>	}	Khambha Dhari Amreli Babra	11 21 22
$Gn_3$ $B_3$	}	Savarkundia Gariadhar	Bhaynagar "

- 4.12 The area of the zone is 5,796 sq km. All the taluks excepting Savarkundla and Dhari which cover more than 1,000 sq km are between 400 and 830 sq km in area. The vlevations vary between 100 and 250 masl excepting Khambha where the maximum elevation is 529 masl. Mainly deep black soils predominate in the zone and irrigation is negligible except in Amreli which has 11 per cent of the cropped area under irrigation.
- 4.13 Forests occupy negligible area. Fallow lands are very small excepting in Dhari where these occupy 11 per cent. Permanent pastures cover 5—10 per cent area excepting in Savarkundla and Gariadhar where these account for aout 20 per cent. Detailed taluk data on barren and uncultivated lands are not available but the district averages for such lands are 5 per cent in Amreli and 13 per cent in Bhavnagar. The net sown area is, therefore, high ranging between 61 and 85 per cent of geographical areas of the taluks. In Lathi, Amreli, Gariadhar and Lila the net sown area exceeds 80 per cent, the average for the zone being 75 per cent.
- 4.14 The annual average rainfall based on the 10 years data is 53 cm. July is the month of maximum rainfall with an average of 18 cm which represents 33 per cent of the annual precipitation. July and August together account for more than 50 per cent of annual rainfall. Rainfall of the other months is between 5 to 10 cm.
- 4.15 The cropped area of the zone is 3.6 per cent of the gross cropped area in the State. Fifty per cent of the area is under groundnut, followed by bajra and jowar with 24 and 12 per cent respectively. There are 4 taluks which have 50 to 60 per cent area under groundnut. Bajra generally varies between 20 and 35 per cent excepting in Babra where jowar covers about 20 per cent and area under bajra is negligible.
- 4.16 The relative yield index values of principal crops are given in Table 11. Groundnut yields are close to all-India level. The yields of bajra are excellent being nearly twice the all-India value in Amreli but Kharif jowar yield is on the low side though better than that in Zone I.
- 4.17 Sheep arc larger in number than the rest of the animals except in Khambha and Dhari taluks where male cattle predominate. Male cattle and goats constitute 19 and 17 per cent of the livestock population of the zone respectively. Female cattle and young stock are nearly equal in number. Female buffaloes are 10 per cent or higher only in a few taluks. Young stock of buffaloes is about 7 per cent.

The livestock patterns are:

$$\left.\begin{array}{c} Dhari \\ Khambha \end{array}\right\} \quad Cm_4 \ Cf_4 \ Cy_4 \ G_4 \\ rest \ of \ the \ zone \ S_4 \ G_4 \ Cm_4 \ Cf_4 \end{array}$$

TABLE 11

Relative Yield Index of Principal Crops in Zone II

District	Crop	Area '000 ha	Per cent of gross cropped area	RYI*
Amreli	groundnut	232	45 .0	96
	bajra	65	12 · 7	193
	jowar (kharif)	65	12 · 7	61
Bhavnagar	groundnut	176	27 -9	93
_	bajra	192	30 •4	167
	jowar (kharif)	104	16 · 5	35

<sup>\*</sup>RYI or Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

### Rainfall Zone III— $E_4$ ( $C_2D_1$ $E_1$ ) $E_4$

4.18 The districts and taluks included in the zone and their cropping patterns are given below:

Cropping pattern	Taluk	District
B4 Jk4 W4 O4/G4/Gn4	Chanasma	Mehsana
1 0	Harij	**
C <sub>3</sub> Jk <sub>4</sub> (B <sub>4</sub> )	Sami	**
Gn <sub>3</sub> Jk <sub>4</sub> B <sub>4</sub>	<b>J</b> odiya	Jamnagar
B <sub>2</sub> F <sub>4</sub>	) Vav	Banaskantha
harman and a second	<b>→</b> Tharad	**
	J Deodar	**
Tailer - La arr	Santalpur	**
$B_3 \text{ Jk}_4 \text{ F}_4/\text{C}_4(\text{W}_5)$	Dhanera	>>
	Radhanpur	**
	Kankrej	>1

- 4.19 The area of this zone is 11,704 sq. km. A number of taluks of this zone have areas between 1,200 and 1,700 sq. km., but Harij taluk has the lowest area of 407 sq km. Almost the entire zone is between sea level and 100 masl excepting Dhanera taluk where the heights vary between 150 and 200 masl. Only five taluks have population density exceeding 100 per sq km. However, the highest density of 197 is in Chanasma and the lowest of 41 in Santalpur. Grey brown or desert soils predominate in the zone. Kankrej has 27 per cent irrigated area followed by Dhanera and Chanasma with 15 per cent. Elsewhere irrigation is negligible.
- 4.20 Mehsana district has practically no forests but the area under forests in Banaskantha district is 11 per cent of the reporting area. Fallow lands are 28 per cent in Santalpur followed by Radhanpur 21 per cent and Vav 19 per cent. Five to 10 per cent of area is under permanent pastures in a number of taluks. The net sown area is high being 70 to 85 per cent over most of the zone.

- 4.21 The average annual rainfall is 45 cm. July is the month of maximum rainfall with an average of 15 cm August gets 10-12 cm and September 8 to 10 cm of rainfall. June rainfall is less than 5 cm. July and August together account for 60 per cent of annual precipitation.
- 4.22 The cropped area of the zone is 835 thousand ha representing 8 per cent of the total cropped area in the State. The main crops are bajra, jowar, fodder, cotton and wheat. Three taluks have over 10 per cent of cropped area under fodder crops. In five taluks of Banaskantha district bajra occupies 50 to 67 per cent of total cropped area. Cotton is confined to a few taluks in Mehsana district, Sami taluk has 46 per cent of cropped area under cotton. Jowar is grown on 6 to 25 per cent area.
- 4.23 The relative yield index values of the crops of Banaskantha and Mehsana districts are given in Table 12. The yield of jowar is less than half of all-India average, yield of bajra is 73 per cent of all-India in Banaskantha but in Mehsana, the yield is 190 per cent of all-India average. Cotton yields are about twice of all-India yields. Yields of wheat in both the districts are well above the all-India level.
- 4.24 Sheep population is the highest in five taluks, their percentages ranging between 24 and 38. In Jodiya and Vav taluks sheep account for 34 and 38 per cent respectively of the total livestock population. Goats constitute 16 to 25 per cent followed by male cattle whose number ranges from 11 to 23 per cent. Female and young stock of cattle average 14 per cent and 11 per cent respectively. Male buffaloes are almost absent. Female buffaloes are generally between 7 to 11 per cent but in two taluks Chanasama and Harij, they form 20 and 14 per cent of the total livestock population. The livestock patterns are:

	-
Taluk	Pattern
Jodiya Vav	$S_3$ $G_4$ $Cm_4$
Santalpur	1
Tharad Dhaneru	S <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub> G <sub>4</sub>
Deodar	1
Kankrej Radhanpur	G <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub> S <sub>4</sub> /Bf <sub>4</sub> /Cy <sub>4</sub>
Chanasma	5
Sami Harij	Cm <sub>4</sub> Cf <sub>4</sub> G <sub>4</sub> Cy <sub>4</sub> /Bf <sub>4</sub>
***************************************	J

TABLE 12

Relative Yield Index of Principal Crops in Zone III

District/crop	Area '000 ha	per cent of gross cropped area	RYI*
Banaskantha			
bajra .	314	34 • 4	73
jowar (kharif)	110	12.0	44
wheat	53	5 - 7	112
cotton	22	2 - 4	150

Table 12 (Cantd.)

District/crop	Arca '000 ha	per cent of gross cropped area	f *RYI
Mehsana			
bajra	202	26 ·1	190
jowar (kharif)	140	18 ·1	44
wheat	73	9 · 4	139
cotton	67	8 · 6	204

\*RYI or Relative Yield Index represents district yield expressed aspercentage of the corresponding all-India average yield for 1968-69 to 1970-71.

### Rainfall Zone IV— E<sub>4</sub> (C<sub>2</sub> D<sub>2</sub>) E<sub>4</sub>

4.25 The districts and taluks included in the zone and their cropping patterns are:

Cropping Pattern	Taluk	District
B <sub>3</sub> Gn <sub>4</sub> C <sub>4</sub> Jk <sub>4</sub> /F <sub>4</sub>	Sayla	Surendranagar
$C_2 Jk_4/B_4$	Dasada	,,
	Limbdi	,,
$C_3$ Jk <sub>4</sub> B <sub>4</sub>	Wadhwan	,,
B <sub>3</sub> Gn <sub>4</sub> Jk <sub>4</sub>	↑ Muli } Umrala } Gadhada	Bhavnagar
	_	,,
10	Sehor	27
Jk <sub>3</sub> B <sub>4</sub> Gn <sub>4</sub> /W <sub>4</sub>	Vallabhipur	<b>5</b> .

- 4.26 The area of the zone is 8,669 sq km. Areas of taluks vary from 400 to 1,700 sq km although areas of Limbdi and Dasada taluks are 1,713 and 1,634 sq Elevations in all the taluks excepting Sayla are between sea level and 150 masl. Elevations in Sayla, range between 150 and 237 masl. Surendranagar district are deep or medium black and grey brown and in Bhavnagar district deep black and coastal alluvium. Based on data for recent few years, July receives the highest rainfall, although there are wide variations. The rainfall of this zone is not high, Sixty to Seventy per cent being 45-55 cm annually. of the annual rainfall occurs in the months July and Wadhwan has a population density of 202 per sq km followed by Sehor and Umrala with 137 and 133 respectively. In other taluks density is less than 100.
- 4.27 Fallow, pasture and cultivable waste lands are negligible excepting in Umrala and Vallabhipur where 25 and 11 per cent of the area is fallow. The net sown area generally ranges between 50 and 70 per cent.
- 4.28 Irrigation is almost negligible excepting in Wadhwan, Muli and Vallabhipur which have 10 to 15 per cent area irrigated.
- 4.29 The cropped area of the zone is 568 thousand ha which corresponds to about 5 per cent of the total cropped area of the entire State. The main crops are cotton, bajra, jowar, groundnut and wheat which occupy 36. 21, 19, 11 and 5 per cent of cropped area respectively. Cotton in Dasada taluk covers 67 per cent area and in Limbdi and Wadhwan about 50 per cent. Bajra occurs all over the zone but its area varies widely from 8 per cent in Dasada to 45 per cent in Umrala.

Jowar is uniformally distributed except in Vallabhipur, where it occupies 45 per cent area.

- 4.30 The relative yield index values of crops are given in Table 13. Yields of cotton arc on the high side. Yields of groundnut vary widely in the zone with as low as 44 per cent of all-India in Surendranagar and 93 per cent in Bhavnagar of all-India average. Wheat yields in the zone are satisfactory. Yield of bajra are low in Surendranagar being only 65 per cent but in Bhavnagar the yield is very high being 167 per cent of the all-India average. Jowar (kharif) yields are extremely low.
- 4.31 Sheep population is 25 to 30 per cent of the livestock population in the taluks of Sihor, Gadhada and Umrala. Elsewhere, goats or male cattle are larger in number. However, none of the livestock in any taluk of the zone exceeds 30 per cent of the total of the corresponding taluk.

### The patterns are:

Taluk	Pattern
Muli Umrala Gadhada Sihor Sayala	$\begin{cases} S_4 & Cm_4 & Cf_4 & G_4 \end{cases}$
Dasada Eimbdi Vallabhipur Wadhwan	$ \begin{cases} Cm_4 & Cf_4 & Cy_4 & G_4/S_4 & Bf_4 \\ G_4 & Cm_4 & Cf_4 & Cy_4 \end{cases} $

TABLE 13

The Relative Yield Index of Principal Crops in Zone IV

District Crop	'Area '000 ha	Per cent of gross cropped area	RYI*
Surendranagar	122	17.7	15
jowar (kharif) bajra	133	19 · 3	65
wheat	20	30 .0	153
groundnut	50	7 •2	44
cotton	296	42 .9	85
Bhavnagar			
jowar (kharif)	104	16 · 5	35
bajra	192	30 •4	167
wheat	26	4 · 1	109
groundnat	177	28.0	93
cotton	32	5 · 0	153

<sup>\*</sup>RYI or Relative Yield Index represents district yield expressed as percentage of the corresponding all-India yield for 1968-69 to 1970-71.

### Rainfall Zone V- E<sub>4</sub> (B<sub>1</sub> C<sub>1</sub> E<sub>2</sub>) E<sub>4</sub>

4.32 The districts and taluks included in the zone along with their cropping patterns are given below:

_		_
Cropping pattern	Taluk	District ,
$Gn_I$	Bhanvad Jamjodhpur Kalavad	Jamnagar ,,
$Gn_2 Jk_4/B_4$	} Khambhaliya Lalpur	> <b>&gt;</b>
$Gn_3 Jk_4 B_4$	} Jamnagar Dhrol	"
$B_3$ $Gn_4$ $Jk_4$	Una	Junagadh
$Gn_1$	Bhesan .	**
$Gn_2\ W_4/C_4/Jr_4$	Visavadar	,,
$Gn_3 B_4 Jk_4$	Patan Veraval	<b>,,</b>
$\operatorname{Gn}_3 C_4 \operatorname{F}_4/Jr_4$	Ranavav Kutiyana	> <b>7</b>
Gn <sub>4</sub> Jr <sub>4</sub> F <sub>4</sub> B <sub>4</sub>	Porbandar	,,
B <sub>3</sub> Gn <sub>4</sub> S <sub>4</sub>	Kodinar	Amreli
B <sub>3</sub> Jk <sub>4</sub> Gn <sub>4</sub>	Rajula Jafrabad	22 21
$Gn_i$	Kunkavav- Vadia Dhoraji Jepur Jamkondarna Gondal Lodhika Paddhari Kotda Sangani Upleta	Rajkot
$G_{n_2}$ $B_4/C_4$	} Rajkot ∫ Jasdan	99 92 .
Gn <sub>3</sub> B <sub>4</sub> Jk <sub>4</sub> /C <sub>4</sub>	Morvi Wankaner	>? >?
C <sub>3</sub> Jk <sub>4</sub> /B <sub>4</sub> B <sub>3</sub> Gn <sub>4</sub> Jk <sub>4</sub> /F <sub>4</sub>	Maliya Ghotila	Surendranagar
C <sub>2</sub> Jk <sub>4</sub> /B <sub>4</sub>	Lakhtar   Halvad   Dhrangadhra	>> >> >1
B <sub>4</sub> Jk <sub>4</sub> W <sub>4</sub> O <sub>4</sub> /C <sub>4</sub> /Gn <sub>4</sub>	Patan Sidhpur Kheralu Mehsana	Mehsana
$B_4$ Jk <sub>4</sub> W <sub>4</sub> /F <sub>4</sub>	Vadgam	Banaskantha
C <sub>2</sub> Jk <sub>4</sub>	Viramgam	Ahmedabad

4.33 It is the second biggest zone having an area of 36,913 sq km and covering 41 taluks of the districts of Jamnagar, Surendranagar, Amreli, Rajkot, Junagadh Mehsana, Banaskantha and Ahmedabad. The areas of the taluks vary widely from 300 sq km to 1,700 sq km, more than 40 per cent of the taluks having area exceeding 1,000 sq km. The maximum and minimum heights in most of the taluks vary between sea level and 300 masl. In Bhesan taluk, however, the elevations

range from 150 to 600 masl. The total population of the zone is 5.3 million with an average density of 144 per sq. km. The density varies very considerably from 67 in Lalpur to 371 in Rajkot, which is the highest for the zone. Density in Sidhpur is 350 and Veraval (Patan) with 278 followed by Mchsana with 311, Jamnagar with 294. Eight of the taluks have density between 67 and 80.

- 4.34 Permanent pastures and other grazing lands occupy 8 per cent of the geographical area of the zone. Individually in a number of taluks these vary upto 15 per cent. Land not available for cultivation is 13 per cent and fallow lands account for 3 per cent. This leaves only two-thirds of the geographical area as net sown area. In individual taluks there is considerable variation in the proportion of net area sown to total reporting area from 41 to 84 per cent.
- 4.35 Fourteen per cent of the area of the zone is irrigated. In taluks of Patan, Sidhpur, Kheralu, Mehsana and Vadgam 20 to 30 per cent area is irrigated. There are a number of taluks where irrigation is 10 to 20 per cent but inapleta and Dhoraji taluks the area irrigated is 30 to 34 per cent. Soils in Jamnagar, Junagadh, Amreli and Rajkot districts are coastal alluvium or medium black mostly except for a patch of red and black soils in Junagadh (northern portion). In other parts of the zone, the soils are grey brown.
- 4.36 The annual average rainfall of the zone is 60 cm, individual values varying between 45 and 75 cm, July is the month of maximum rainfall. July and August together account for two-thirds of the annual rainfall of the Zone. July and August each get more than 10 cm/pm.
- 4.37 The gross cropped area of the zone is 2,513 thousand hectares, representing one-fourth of the gross eropped area of the State. The principal crops of the zone are groundnut, bajra, jowar and cotton, occupying respectively 38, 18, 15 and 13 per cent of the gross cropped area. Fodder, other oilseeds other pulses have 1-3 per cent and sugarcane and Groundnut is a jowar (rabi) less than 1 per cent. dominant crop in 12 taluks accounting for 70 per Bajra is grown throughout the eent or more of area. zone, but excepting in Amreli, Mehsana and Surendranagar the areas are not high. Area under (kharif) is less than 10 per cent excepting in Surendranagar and Mehsana, where it ranges between 10 and A few taluks of Jamnagar also have 20 30 per cent. to 35 per cent area under jower (kharif). (rabi) is significant only in two taluks of Porbandar and Kutiyana. Cotton is significant in Surendranagar and in taluks of Rajkot and Viramgam. Elscwhere. cotton area is less than 10 per cent.
- 4.38 Relative yield index values of crops are given in Table 14. Jowar (kharif) has got the lowest yield being about 43 per cent of all-India average. On the other hand, rabi jowar yields are very high in areas where it is grown. Bajra yields are on the whole high being 120 to 200 per cent of all-India level. Only in Surendranagar bajra yield is low. Yields of ground-nut in Junagadh are the highest with 137 per cent of 3—737 Agri/76

all-India. The lowest yield is in Surendranagar. Cotton yields are all very high except in Surendranagar where it is as low as 85 per cent of all-India. This is also lowest in the whole State, the State average being 144 per cent of all-India average.

4.39 Among livestock, the highest population in the zone is that of sheep which account for a significant proportion in Junagarh, Jamnagar, Surendranagar and Rajkot districts. Male cattle, goats, female cattle, young stock of cattle and female buffaloes are nearly equal in number. The rest are negligible. 'The livestock patterns are:

Taluk	Pattern
Lodhika Kotda	$S_3$ Cm <sub>4</sub> $G_4$
Dharangdhara	S <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub> G <sub>4</sub>
Khambhalia Lalpur Porbander	} S <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub> G <sub>4</sub> /Cy <sub>4</sub>
Jamnagar Kalvad Padhari Jamkundera	
Jetpur Gondal Rajkot	S <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub> G <sub>4</sub>
Wankaner Jasdan Rajula	}
Bhanvad Jodhpur Ramavat Kutiyana Upleta Dhoraji	Cm <sub>4</sub> Bf <sub>4</sub> S <sub>4</sub> Cy <sub>4</sub> /Cf <sub>4</sub>
Kodinar Veraval	Cm <sub>4</sub> Cf <sub>4</sub> Cy <sub>4</sub>
Una Bhesan Visavdar Kumkav Vadar Jafrabad Patan	Cm <sub>4</sub> Cf <sub>4</sub> Cy <sub>4</sub> G <sub>4</sub> /S <sub>4</sub> /Bf <sub>4</sub>
Viramgam Lakhtar Ghotila	$\begin{cases} Cm_4 Bf_4 Cf_4 Cy_4 \end{cases}$
Vadgam Sidhpur Kheralu Mehsana	Bf <sub>4</sub> By <sub>4</sub> Cm <sub>4</sub> G <sub>4</sub>

TABLE 14

The Relative Yield Index of Principal Crops in Zone V

Crop	District						
	Jam- naga	Juna- r gadh	Amreli	Raj- kot	Suren- dra- nagar	Meh- sana	
paddy	67	65	70	67		63	
iowar (kharif)	25	53	61	33	15	44	
jowar (rabi)	_	168			170		
baira	121	202	193	128	65	190	
small millets	99	127	_	-	100	181	
groundnut	77	137	96	82	44	80	
cotton	155	201	154	156	85	204	

Note: Relative Yield Index represents district yield expressed as a percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

### Rainfall Zone VI— $E_4$ ( $B_1$ $C_2$ $E_1$ ) $E_4$

4.39 The districts and taluks included in the zone and their cropping patterns are:

Cropping Pattern	Taluk	Districts
$B_3$ Gn <sub>4</sub> Jk <sub>4</sub>	Botad	Bhavnagar
	Palitana	,,
$Jk_3 B_4Gn_4/W_4$	Bhavnagar	94
Gn <sub>3</sub> B <sub>3</sub>	Ghogha	Bhavnagar
	Talaja	73
	Mahuwa	,,
$B_3 W_4 O_4 F_4/Jk_4$	Vijapur	Mehsana
	Visnagar	,,
$B_4 C_4 W_4 Jk_4$	Kalol	94
	Kadi	**
$B_3$ Gn <sub>4</sub> C <sub>4</sub>	Dehgam	Ahmedabad
	Dhandhuka	1,
$C_3$ Jk <sub>4</sub> $W_4/Pd_4$	Dho¹ka	,,
	Sanand	>1
C4 Mt4 Pd4 Jr4/Gn4 M4	Jambugam	Vadodara
B <sub>3</sub> C <sub>4</sub> Jk <sub>4</sub> W <sub>5</sub>	Gandhinagar	Gandhinagar
$W_4$ $B_4$ $C_4$ $Pd_4$	Gambay	Kheda

404. The zone comprise of 17 taluks in Ahmedabad (4), Gandhinagar (1), Mehsana (4), Bhavnagar (6), Vadodra (1) and Kheda (1) districts and covers an area of 16,729 sq km which is about 8 per cent of the area of the State. Areas of individual taluks vary between 437 and 2,719 sq km. The elevation ranges between sea-level and 170 masl except in Jambugam and Palitana, where the elevations are from 150 to 333 and 100-498 masl respectively. There is considerable variation in the type of soils which occur in the different districts of the zone as shown below:

Ahmedabad,	Mehsana ar	ıd	Gandhinagar		1	
areas				grey	brown	soils
Bhavnagar				deep	black	soils
				and	c	oastal
				alluv	ium	
Kheda and B	laroda (Vado	oı	r)	deep	ra medi	umda
				black	soils	and
				coast	al allu	vium

In Mehsana, 20 to 35 per cent area is irrigated followed 10-20 per cent in Ahmedabad and Baroda taluks. The population density as greater than 300 per sq km in Mehsana and Gandhinagar and between 100 and 200 elsewhere, in general.

4.41 Fallow lands are small in area and cultivable waste less than 5 per cent of reporting area. Permanent pastures occupy 10-15 per cent in some of the taluks. The net sown area varies between 60 and 86 per cent excepting in a few taluks. In Bhavnagar taluk, the net sown area is only 25 per cent.

4.42 This is a zone of moderate rainfall, the annual total being 60 to 70 cm, the average for the whole zone is 67 cm. July is the month of maximum rainfall of 20-25 cm and July and August are the main rainy months which together account for 60 per cent of the annual precipitation. Month of July, August and

September each generally receive more than 10 cm pm. Rainfall in June varies between 6 and 10 cm but in other months rainfall is negligible.

4.43 The cropped area of the zone is 1,167 thousand ha, which represents 10 per cent of the gross cropped area of the State. The principal crops are bajra covering 25 per cent followed by wheat with 13, cotton 20, jowar 13, groundnut 12 and fodder 6 per cent. Excluding taluks of Ahmedabad district bajra area is generally more than 30 per cent. In Bhavnagar, the main crops are bajra, groundnut and jowar, which together account for more than 70 per cent of the gross In Mehsana, bajra, wheat fodder, cropped area. other oilseeds and jowar constitute the main crops. Cotton also is grown to a noticeable extent in some of Area under cotton is substantial in Wheat and jowar are grown over 10 the taluks. Ahmedabad. to 20 per cent area and fodder crops occupy 10 per cent area in some of the taluks. In the remaining taluks bajra, wheat, cotton and jowar form the main crops.

4.44 The relative yield index values of the principal crops are given in Table 15. Except rice and jowar the yields are normal or very high. In regard to rice the rainfall average is 67 cm, which is insufficient for paddy crop without irrigation. In the absence of adequate irrigation facilities, yields can not improve. Cotton yields are very good being twice the all-India average in Mehsana followed by 153 per cent of all-India value in Bhavnagar and 125 per cent in Ahmedabad. Groundnut yields are low being less than 70 per cent of all-India average in Ahmedabad and only 80 per cent in Mehsana.

4.45 Sheep are dominant in Bhavnagar but are negligible in the rest of the zone. Male cattle are between 15 and 20 per cent though in some individual taluks, they constitute 26 to 33 per cent of total livestock. Female buffaloes preponderate in Mehsana and Ahmedabad. In Visnagar and Kalol taluks of Mehsana they are 30 per cent of the total livestock.

The livestock patterns of this zone are:

Taluk		Pattern
Dhanduka Dholka Sanand Jambugam Gandhinagar Botad Palitana		Cm <sub>4</sub> Bf <sub>4</sub> Cf <sub>4</sub> Cy <sub>4</sub>
Ghogho Mahuwa	}	S <sub>4</sub> G <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub>
Visnagar Vijapur Kadi Kalol Cambay		Bf <sub>4</sub> By <sub>4</sub> Cm <sub>4</sub> G <sub>4</sub>

TABLE 15
Relative Yield Index of Principal Crops
in Zone VI

Crop	District			
	Ahmedabad	Mehsana	Bhay- nagar	
rice	82	63	- 63	
iowar (kharif)	28	44	35	
baira .	173	190	167	
wheat .	73	139	109	
groundnut	69	80	93	
cotton	125	204	153	

Note: Relative yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

### Rainfall Zone VII—E<sub>4</sub> (B<sub>2</sub> E<sub>2</sub>) E<sub>4</sub>

4.46 The districts and taluks included in the zone along with their cropping patterns are given below:—

Cropping pattern	Taluk;	District
B <sub>3</sub> Jk <sub>4</sub> W <sub>5</sub>	Deesa	Banaskantha
$B_4 Jk_4 W_4/F_4$	Palanpur	Banaskantha
$M_4 M t_4 W_4 F_4 B_4$	Danta	Banaskantha
$M_3 C_4 W_5$	Khedbrahma	Sabarkantha

- 4.47 The area of the zone is 4,231 sq km. Area of Danta and Khedbrahma taluks is around 850 sq km and that of Deesa and Palanpur more than 1,000 sq km. Elevations in Danta and Khedbrahma taluks range between 300 and 600 masl, in Palanpur from 150 to 1,090 masl and in Deesa from 135 to 205 masl. Main grey brown or desert soils dominate the zone. Khedbrahma has 85 per cent, Palanpur and Danta 20 to 30 per cent and Deesa 15 per cent area under irrigation. The population density varies between 80 and 219 per sq km. Palanpur has the highest density in the zone of 219 and the average density for the whole zone is 140.
- 4.48 Fallow land is negligible. Deesa and Palanpur have 9 to 17 per cent area under permanent pastures. Information about areas under forests in different taluks is not available but in Banaskantha district where Danta, Deesa and Palanpur are located, forest area is significant. The net sown area is 21 per cent in Danta, 2 per cent is Khedrahma and over 79 per cent of geographical area in Deesa and Palanpur.
- 4.49 The rainfall of the zone varies between 60 and 85 cm annually in 30 rainy days. July is the month of maximum rainfall, July and August together accounting for 60 to 70 per cent of annual precipitation. July and August are the months with more than 10 cm pm. July gets 25 to 30 cm rainfall and August 20 to 25 cm. Rainfall in June is 5 to 7 cm and in September 9 cm. Rainfall in other months is negligible.
- 4.50 The gross cropped area of the zone is 2.822 thousand ha, which is nearly 3 per cent of the total gross cropped area of the State. Bajra is dominant crop in Deesa and Palanpur districts and maize in rest of the zone. The principal crops of the zone are bajra, jowar, fodder and maize each accounting for

- 32,15,12 and 9 per cent of the cropped area respectively. Area under crops like wheat is 6 per cent, other oilseeds 5, other pulses and small millets 4 per cent each.
- 4.51 The relative yield index values of the crops are given in Table 16. Yield of cotton is 1½ times of all-India average and that of wheat higher than all-India. Yield of bajra is only 73 per cent of all-India and that of jowar 44 per cent.
- 4.52 Goats constitute 35 to 40 per cent of live-stock population in Danta and Khedbrahma. In Dessa, Sheep account for 13 per cent but their number is not significant in the rest of the zone. Male cattle is 18 per cent, female cattle 15 per cent and young stock of cattle 11 per cent. Female buffaloes are significant in numbers in Palanpur. Elsewhere, they are about 8 per cent. The main livestock patterns of the zone are:

Taluk		Pattern
Khedbrahma Danta Palanpur	\ {	G <sub>3</sub> Cm <sub>4</sub> Cf <sub>4</sub>
Decsa	Ĵ	$G_4$ Cm <sub>4</sub> Cf <sub>4</sub> Cy <sub>4</sub> /Bf <sub>4</sub>

TABLE-16

Relative Yield Index of Crops in Zone VII

Crop	Area '000 ha	Percent of gross cropped area	RYI*	
bajra	314	34 •4	74	
jowar (kharif)	110	12.0	44	
maize	136	1 .5	92	
wheat	52 -6	5 <b>· 7</b>	112	
cotton	22 ·1	2 · 4	150	

<sup>\*</sup>Relative Yield Index represents Banaskantha district yields expressed as percentage of the corresponding all-India average yields for 1968-69 to 1970-71.

### Rainfall Zone VIII—E<sub>4</sub> (B<sub>2</sub> C<sub>2</sub>) E<sub>4</sub>

4.53 The districts and taluks included in the zone along with their cropping patterns are given below:—

Cropping Pattern	Taluk	District	
B <sub>4</sub> M <sub>4</sub> Pd <sub>4</sub> R <sub>4</sub>	Shehera	Panchmahals	
M <sub>3</sub> Pd <sub>4</sub> Gn <sub>4</sub> /Mt <sub>4</sub> /B <sub>4</sub>	Linkheda	1,	
M <sub>4</sub> Pd <sub>4</sub> Gn <sub>4</sub> G <sub>4</sub>	Linkheda   Dohad   Jhalod	**	
M <sub>4</sub> Pd <sub>4</sub> Gn <sub>4</sub> Mt <sub>4</sub> /B <sub>8</sub>	Lunavada	55	
C3 Jr4 Pd4 To4/Mt 4			
$(B_4 T_{04})$	Savli	Baroda	

4.54 The area of the zone is 5,054 sq km, areas of individual taluks varying between 580 and 1064 sq km. Except for Savli which is at sea level, heights in the rest of the zone range between 100 and 500 masl. The soils are medium black. Area in Panchmahals, district is almost entirely irrigated but Savli has only 10 per cent irrigated area. The population of the zone is 10 lakhs and the population density 201 per sq km. Four of the six taluks have density close to 200, the highest density of 270 being in Dohad and the lowest of 153 in Limkheda.

4.55 Fallow lands are negligible and permanent pastures occupy 5 to 10 per cent area in 4 of the taluks. The net sown area varies between 40 and 60 per cent excepting Savli where it is around 80 per cent.

4.56 The average annual rainfall of the zone is about 80 cm. July is the month of maximum rainfall with 30 cm and with that of August contributes 60-65 per cent of the annual total. This is a zone of moderate rainfall with two months getting more than 20 cm pm.

4.57 The cropped area of the zone is about 304 thousand ha representing 3 per cent of the total cropped area in the State. The main crops of the zone are maize, paddy, cotton and groundnut occupying 28, 15, 10% each respectively. Bajra, gram and small millets cover between 6 and 7%, wheat, ragi and tobacco 3 and jowar (rabi) 2 per cent area in the zone. Excluding Savli, all the other taluks have significant area under maize; areas in Dohad and Limkheda being 49 and 44 per cent respectively. paddy is grown all over the zone in 10 to 20 per cent area. Lunavada and Limkheda have 22 per cent area under paddy. The surface and average for cotton of 10 per cent area is not representative and it is only Savli which has cotton occupying 41 per cent of the area. Areas under cotton in other taluks are negligible. Savli is the only taluk in the zone where tobacco is grown and the area covered is 14 per cent. Small millets are grown on 5 to 10 per cent of the area. Gram in Jhalod and Dohad occupies 10-12 per cent area.

4.58 The relative yield index values of crops are given in Table 17. The yield of rice is only 73 per cent of all-India average. The yield of maize is .93 per cent of all-India average. Groundnut yield is normal in the zone. Yields of jowar (rabi), bajra and cotton are high. Yields of small millets is twice of all-India average. An interesting feature is that the yield of gram is 89 per cent of all-India level.

4.59 Male cattle are the largest in number with an average of 30 per cent for the zone followed by goats with taluk values ranging between 13 to 33 per cent; their zonal average being 21 per cent. Female and young stock of cattle average 12-13 per cent of total livestock. Female buffaloes in Lunavada and Savli are 20 per cent of total livestock. Young stock of buffaloes are also important in the two taluks with 15

and 19 per cent respectively. The livestock patterns of the zone are:

Taluk		<b>Pa</b> ttern
Shehera Limkheda Dohad	}	Cm <sub>3</sub> G <sub>4</sub> Cf <sub>4</sub>
Jhalod		$\operatorname{Cm_4} \mathbf{G_4} \operatorname{Cf_4/Cy_4}$
Lunavada		Cm <sub>4</sub> Bf <sub>4</sub> By <sub>4</sub> G <sub>4</sub>

TABLE 17

Relative Yield Index of Principal Crops in Zone VIII

Crop	Area '000 ha	Per cent of gross Cropped Area	RYI*
rice	78	14.9	73
jowar (rabi)	7	1 ·3	168
bajra	40	7 ·8	140
maizc	153	29 ·4	93
ragi	17	3 • 2	92
small millets	28	5 ·4	191
gram	. 24	4 · 6	89
groundnut	60	11 •4	104
cotton	28	5 · 3	150

\*Relative Yield Index represents Panchmahals district yields expressed a percentage of the corresponding all-India average yields for 1968-69 & 1970-71.

### Rainfall Zone IX-E<sub>4</sub> (A<sub>1</sub> C<sub>3</sub>) E<sub>4</sub>

4.60 The district and taluks included in the zone and their cropping patterns are:

Cropping Pattern	Taluk	District
$Gn_1$	Manavadar Keshod I si Malia Talala Mendarda	Junagadh ,, ,,
$Gn_2 W_4/C_4/Jr_4$	Yanthali Junagadh	"
$Gn_3$ Jk <sub>4</sub> F <sub>4</sub>	Mangrol	,,
$Jk_3 C_4 Gn_4 Pd_4/Fr_4$	Ghorasí	Surat
$C_3$ Jk <sub>4</sub>	Olpad	,,
C <sub>5</sub> C <sub>2</sub> Jr <sub>4</sub>	Amod Jambusar Vagra Bharuch	Bharuch
C <sub>2</sub> Jk <sub>4</sub>	Hansat	,,
C3 Jr4 Jk4	Ankleshwar	. ,,

4.61 The zone comprises of 16 taluks and covers an area of 9,844 sq km. Area of Jambusar taluk is 1,097 but the remaining taluks are less than 1,000 sq km. About a third of the taluks are less than 500 sq km in area. All the taluks of Bharuch and Surat are at sea level. Except in Junagadh and Mendarda taluks, the heights vary between sea level and 150 masl. The maximum elevation in Junagadh and Mendarda is 1117 and 480 masl respectively. Surat and Broach districts have mainly medium or deep black soils with coastal alluvium. In Junagadh, medium black or red and black with coastal alluvium soils prevail. The population density in Talala and Vagra is about 75 per sq km. Excepting Bharuch and Ghorasi which have density exceeding 300 the population density in the rest varies between 100 and 300.

4.62 Forest area is also not high. Follow and permanent pasture lands are mostly negligible. This leaves the net sown area between 60 to 80 per cent of reporting and excepting Talala which has only 25 per cent net sown area.

4.63 Mangrol has 32 per cent irrigated area followed by Ghorasi, Amod and Bharuch with 20 to 30, Junagarh between 10 and 20 and Olpad 15 per cent. Irrigation in the remaining zone is negligible.

4.64 It is a region of high rainfall with annual averages ranging between 75 and 100 cm. July is the month of maximum rainfall of 30 cm and with August accounts for about 60 per cent of the annual total. Rainfall in June, August and September ranges between 10 to 12 cm pm.

4.65 The total cropped area is 616 thousand ha which is 6 per cent of the gross cropped area in the State. Groundnut and cotton are the principal crops, each grown on 32 per cent of the gross cropped area of the zone. Cotton is the main crop in the taluks of Surat and Bharuch districts, and groundnut in Junagadh. Seven out of eight taluks of Junagadh have 62 to 74 per cent area under groundnut. Six taluks of Bharuch district have 50 to 70 per cent area under cotton. Jowar is the dominant crop of Ghorasi and Olpad with about 40 and 30 per cent of gross cropped area respectively.

4.66 The yields of principal crops are given in Table 18. Yields of groundnut in Junagadh are the highest in the State. Cotton yield in Surat is lower than that in Bharuch though well above all-India average. Jowar yields are very high in Surat but low in Bharuch and Junagadh.

4.67 Male cattle are dominant with an average of 25 per cent of the livestock population in the zone, but in Vagra these constitute 40 per cent. Female and young stock of cattle are 11 to 18 per cent in the taluks of Junagadh and in Hansot and Ankleshwar. Female buffaloes in the zone constitute 12 to 19 per cent of total livestock and young stock of buffaloes 10 to 15 per cent in a number of taluks. Sheep account for 12 to 16 per cent in only 3 taluks of Junagadh, but less than 10 per cent in other parts of the zone. Goats are dominant in Surat and

Bharuch areas and to a lesser extent in other parts of the zone too. The livestock patterns are:

Taluk	Pattern
Manavdar	Cm <sub>4</sub> Bf <sub>4</sub> S <sub>4</sub> Cf <sub>4</sub> /Cy <sub>4</sub>
Vanthali	j
Keshod Mendarda Junagadh Mangrol Malia Talala	Cm <sub>4</sub> Cf <sub>4</sub> Cy <sub>4</sub> G <sub>4</sub> /S <sub>4</sub> /Bf <sub>4</sub>
Vagra Jambusar Amod	
Olpad Hansot Ankleshwar	} Cm <sub>4</sub> G <sub>4</sub> Cy <sub>4</sub> Cf <sub>4</sub> /Bf <sub>4</sub>
Bharuch	G <sub>3</sub> Cm <sub>4</sub> Bf <sub>4</sub>
Ghorasi	G <sub>4</sub> Bf <sub>4</sub> Cm <sub>4</sub>

TABLE 18

Relative Yield Index of Principal Crops in Zone IX

707	Junagadh	Surat	Bharuch
groundnut	137		
jowar (kharif)	53	118	68
wheat	143	_	_
cotton		115	154
jowar (rabi)		169	150

Note: Relative Yield Index represents district yields expressed as percentage of the corresponding all-India average yield for 1968-69 & 1970-71.

### Rainfall Zone X—E<sub>4</sub> (A<sub>1</sub> B<sub>1</sub> C<sub>1</sub> E<sub>1</sub>) E<sub>4</sub>

4.68 The districts and taluks included in the zone and their cropping patterns are:

Cropping Pattern	Taluk ]	District
$B_3 Pd_4 Mt_5 To_4/W_4$ .	Mehmedabad Nadiad (Khee	
Gn <sub>4</sub> B <sub>4</sub> C Pd <sub>4</sub>	Kapadvanj	,,
$M_2 Pd_4$	Vijayanagar	Sabarkantha
M <sub>4</sub> C <sub>4</sub> Pd <sub>4</sub> Gn <sub>4</sub> B <sub>4</sub> /W <sub>4</sub>	Bhiloda	,,
	Meghraj	,,
Gn <sub>3</sub> B <sub>4</sub> C <sub>4</sub>	Prantiji	,,
	Himatnagar	,,
Gn <sub>4</sub> B <sub>4</sub> M <sub>4</sub> C <sub>4</sub>	Modasa	,,
	Malpura	,,
	Bayed	**
C <sub>4</sub> Gn <sub>4</sub> M <sub>4</sub> B <sub>5</sub>	ldar	**
$B_4$ Jk <sub>4</sub> Pd <sub>4</sub> F <sub>4</sub> /W <sub>4</sub>	Ahmedabad	Ahmedabad
	Daskroi	**

4.69 The area of the zone is 9,558 sq km, the areas of individual taluks varying from 287 sq km to 1,135 sq km. Kheda and Ahmedabad taluks of zone are practically at sea level. Sabarkantha area is more clevated. Vijayanagar and Bhiloda have heights ranging between 300 and 450 masl. Elsewhere the elevations are between 100 and 300 masl. The soils are mainly medium or deep black, grey brown and coastal alluvium. Except for 15 to 30 per cent in some of the taluks, irrigated area is not significant in the zone. Taluks of Kheda district have population density exceeding 270 per sq km. The density of Nadiad is 568, Ahmedabad 6,289, Daskroi 283 and in the rest of the zone it varies from 100 to 220.

4.70 Fallow lands are negligible. There are no permanent pastures. Land not available for cultivation accounts for 11 to 12 per cent of the total reporting area in Nadiad, Kapadvanj and Mehmedabad taluks. Net sown area is between 60 and 80 per cent. A few taluks have net sown area between 20 and 40 per cent only.

4.71 The annual rainfall varies between 70 and 90 cm. July receives the maximum rainfall of 30 to 35 cm followed by August with 22 and September 13 cm respectively. June rainfall averages 8-10 cm. June to September rainfall accounts for 95 per cent and July and August together 65 to 70 per cent of annual.

4.72 The cropped area of the zone is 714 thousand ha which represents 7 per cent of the gross cropped area of the State. The principal crops are bajra, groundnut, cotton and maize accounting 20, 18, 17 & 10 per cent of the cropped area respectively. Area under paddy is 9 per cent and under wheat 7 per cent. Bajra occupies 10 to 35 per cent area. In Kheda district, bajra and paddy are the major crops with Kapadvanj having 21-25 per cent area under groundnut and cotton. Nadiad has 11 per cent area under tobacco. Taluks of Sabarkantha district have mainly bajra, cotton, groundnut and paddy. The zone has 8 cropping patterns; 2 are with maize, 2 with bajra, 3 with groundnut and one with cotton.

4.73 The yields of principal crops are given in Table 19. The yield of rice in Sabarkantha district is one-third of all-India average. Yields of bajra and cotton are very high. Groundnut in Sabarkantha is near all-India but moderately low in Kheda. Maize yields are about all-India level. Jowar (kharif) yields are much better than most of the districts of the State though much lower than all-India average.

4.74 Male cattle are uniformally high ranging between 20 and 26 per cent. Population of goats is between 33 and 37 per cent. Sheep number is mostly negligible. Female buffaloes in two taluks constitute 31 per cent of the total livestock population. The main patterns are:

Disctrict	Pattern	
Vijayanagar Bhiloda Meghraj		
Kapadyanj Prantiz Himatuagar	Bf <sub>3</sub> By <sub>4</sub> Cm <sub>4</sub>	

District	Pattern
Ahmedabad Daskroi Mehmedabad Nadiad	
Modasa	
Malpura Bayad	$\mathrm{Cm_4}\;\mathrm{Bf_4}\;\mathrm{By_4}\;\mathrm{G_4}$

TABLE 19

Relative Yield Index of Principal Crops in Zone X

Crop	Sabarkanth	ıa	Kheda
bajra	185	155	
rice	34	109	
jowar (kharif)	68	68	
maize	109	89	
groundaut	99	78	
cotton	152	160	

Note: Relative yields Index represents district yield as percentage of the corresponding all-India average yields for 1968-69 & 1970-71.

### Rainfall Zone XI-E<sub>4</sub> (A<sub>1</sub> B<sub>1</sub> C<sub>2</sub>) E<sub>4</sub>

4.75 The districts and taluks included in the zone and their cropping patterns are:

,		
Cropping Pattern	Taluk	District
Pd <sub>3</sub> W <sub>4</sub> B <sub>4</sub> C <sub>4</sub>	Matar	Kheda
B <sub>3</sub> Pd <sub>4</sub> Mt <sub>5</sub> To <sub>4</sub> /W <sub>4</sub>	Barsad Petlad	"
C <sub>4</sub> B <sub>4</sub> Pd <sub>4</sub> M <sub>4</sub> /To <sub>4</sub>	Thasra Balasinor	**
$To_3 B_4 Pd_4$	Anand	**
$M_3 \text{ Pd}_4 \text{ Gn}_4/\text{Mt}_4/\text{G}_4$	Santrampur Godhra Devgarhbaria	Panchmahals
Gn <sub>4</sub> Pd <sub>4</sub> B <sub>4</sub> C <sub>4</sub>	Katol	,,
C <sub>4</sub> Pd <sub>4</sub> Mt <sub>4</sub> Gn <sub>4</sub> /Jr <sub>4</sub>	Halol	,,
Jr <sub>4</sub> Pd <sub>4</sub> C <sub>4</sub> Mt <sub>4</sub>	Sagbara	Bharuch
$C_2 \operatorname{Jr}_4$	Jhagadia	,,
$C_3 Jr_4 Jk_4$	Valia	,,
C <sub>3</sub> Jr <sub>4</sub> Pd <sub>4</sub>	Nandod	,,
	(Rajpipla)	**
C <sub>4</sub> Pd <sub>4</sub> Jk <sub>4</sub> Mt <sub>4</sub>	Dediapada	,,
Jk <sub>3</sub> C <sub>4</sub> Gn <sub>4</sub> Pd <sub>4</sub> /Fr <sub>4</sub>	Mangrol	Surat
$C_{t}$	Sinor Dabhoi Karjan	Baroda
. C <sub>2</sub> Jr <sub>4</sub>	Vaghodia	""
C <sub>3</sub> Jr <sub>5</sub> Pd <sub>4</sub> To <sub>4</sub> /Mt <sub>4</sub> /(B <sub>4</sub> To <sub>4</sub> )	Vadodara Padra	**

4.76 The zone comprises of 23 taluks in the district of Kheda (6), Panchmahals (5), Bharuch (5), Surat (1) and Baroda (6) and covers an area of 15,950 sq km, which represents 8 per cent of the total geographical area of the State. Five taluks exceed 1,000 so km in area. Sinor in Baroda district has the lowest area of 293 sq km and Santrampur the highest area of 1,360 sq km. Elevations in taluks of Kheda range between sea level to 100 masl. In Panchmahals, the heights vary between 50 and 300 masl although the maximum elevation in Halal is 829 masl. The height variations are larger in Bharuch from 50 to 800 masl and in Baroda from sea level to 100 masl. The soils of the zone are deep or medium black with coastal alluvium. Grey brown soils are also observed in Kheda. In a few taluks like Halol, Devgarbharia and Santrampur irrigated area is more but on the whole it is negligible. The taluks of Kheda district have population density of 200 to 500 per sq km except Anand and Petlad taluks which have densities of 590 and 541 respectively. In taluks of Panchmahals district, the density is around 180, the highest of 297 being in Kalol. The taluks of Bharuch district have density of 131 to 157 except Dediapada which has the lowest density of 166.

4.77 The net sown area is very high in taluks of Baroda district, being 75 to 86 per cent of the geographical area. Permanent pastures are negligible. The net sown area in Panchmahals district is from 49 to 69 per cent. In Kheda district the net sown area is high.

4.78 The annual rainfall of the zone varies between 80 and 120 cm. Most of the area of the zone receives 80 to 100 cm. July is the month of maximum rainfall of 30 cm. July and August together account for more than 60 per cent of annual precipitation.

4.79 The cropped area of the zone is 1051 thousand ha representing about 10 per cent of the cropped area of the State. The principal crops are cotton, paddy and bajra, occupying 27, 15 and 10 per cent of the cropped area. Area under jowar (rabi), maize and small millets is 6-7 and under jowar (kharif) groundnut and tobacco 5 per cent cach. Cotton has the highest area and is the dominant crop in Bharuch and Baroda districts. of Baroda taluks have nearly 70 to 75 per cent area The zonal average of 27 per cent under cotton. does not adequately represent its distribution in the Maize crop is important only in taluks of Panchmahals district and jowar (rabi) in the taluks of Bharuch and Baroda districts. Small millets appear only in a few taluks. Tobacco is grown largely in Kheda and Baroda districts. The largest area of more than 22 thousand hectares is in Anand. Paddy is grown all over the zone though the area exceeds 20 per cent in a few taluks only.

4.80 The relative yield index values of crops are given in Table 20. The yields of crops in general are either close to all-India average or a little higher, except those of rice, tur and jowar. Rice yields are not high as the rainfall amount and distribution are

not even near the minimum considered necessary for growing this crop. Although rainfall is adequate for growing jowar crop, yields of kharif jowar are low.

4.81 The livestock population is dominated by male cattle though female buffaloes are important and significant in a number of taluks. The livestock patterns are:

Taluka Dediapada Naudod Mangrol Sinor Dabhoi Kalol Devgarh Baria Godhra Sagbara	Pattern  Cm <sub>3</sub> G <sub>4</sub> Cf <sub>4</sub>
Halol Wagbadia Thasta Balasinor	Cm <sub>4</sub> Bf <sub>4</sub> By <sub>4</sub> G <sub>4</sub>
Valía Jaghodia Santrampur	$ \begin{cases} & Cm_4 \ G_4 \ Cy_4 \\ & Cm_4 \ G_4 \ Cf_4/Cy_4 \end{cases} $
Boarsad Petlad Anand	Bf <sub>3</sub> By <sub>4</sub> Cm <sub>4</sub>
Vadodara	) } Bf <sub>4</sub> Cm <sub>4</sub> G <sub>4</sub>
Padra	)
Matar	Bf <sub>4</sub> By <sub>4</sub> Cm <sub>4</sub> G <sub>4</sub>
Karjan	$S_3 Cm_4 G_4$

TABLE 20
Relative Yield Index of Principal Crops in Zone XI

Crop		State aver-			
	Bharuch	Baroda	Kheda	Panch- mahals	age
rice	62	51	109	73	79
jowar (kharif)	68	68	68	68	43
jowar (rabi)	150	206	168	168	172
bajra	157	159	155	140	147
maize	97	89	89	93	97
small millets	178	191	234	191	188
wheat	113	112	124	113	116
tur	66	74	70	72	67
groundnut	83	87	78	104	96
cotton	154	192	160	150	144
iobaceo	-	115	153	190	148

Note: Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield for 1968-69 to 1970-71.

### Rainfall Zone XII— $E_4$ ( $A_2$ $B_1$ $C_1$ ) $E_4$

4.82 The districts and taluks included in the zone and their cropping patterns are:

Taluk	District
Sankheda	Baroda
Tilakwada	39
Nasavadi	,,
Chhota-Udaip	ur
Jambughoda	Panchmahals
Songadh	Surat
√ Vyara	**
( Palsana	23
∫ Mahuva	,,
(Valod	**
Mandyi	**
Nizar	35
Uchhal	,,
Kamrej	**
Bardoli	**
	Sankheda Tilakwada Nasavadi Chhota-Udaip Jambughoda { Songadh Vyara Palsana Mahuva Valod Mandvi Nizar Uchhal Kamrej

- 4.83 The area of the zone is 7661 sq km. Only Chhota Udaipur has an area of 1,379 sq km. Nine of the taluks of this zone have areas less than 500 and Valod has the lowest of 202 sq km. Elevation varies between 100 and 450 masl with coastal areas at sea level. The soils of the zone are mainly deep black or coastal alluvium. Palsana taluk has 47 per cent area under irrigation followed by Kamrej and Bardoli ranging from 20 to 24 per cent. Ninety per cent of net sown area of Jambughora is irrigated. Irrigation in the rest of the zone is negligible. The population density exceeds 130 per sq km. Only Bardoli taluk has the highest density of 317 in the zone.
- 4.84 A large part of the area is barren and uncultivable land. Fallow land, pastures, etc., are negligible. The net sown area varies from 40 to 90 per cent. Net area sown accounts for more than 70 per cent of the reporting area in seven taluks, 39 to 49 in four taluks and 55 to 60 per cent in the rest of the taluks.
- 4.85 It is a zone with good rainfall, the averages ranging between 100 and 160 cm. In Surat district, the averages are 140 to 160 cm. July is the month of maximum rainfall with more than 50 cm in Surat and 35 to 40 cm in Baroda. August rainfall is 30 cm and in September 20-25 cm. Rainfall in June is 18 cm in Surat and 12 cm in Baroda. July and August account for over 60 per cent of annual precipitation.
- 4.86 The cropped area of the zone is 450 thousand ha representing more than 4 per cent of the gross cropped area of the State. Cotton occupies the largest area followed by paddy, jowar (kharif), jowar (rabi), groundnut, small millets and gram with 26, 15, 12, 10, 8, 6 and 4 per cent respectively. In eleven of the fifteen taluks in this zone, paddy is grown on more than 10 per cent area. Valod, Mahuva, Vyara, Sangod and Bardoli taluks occupy

- 20 to 23 per cent of their respective cropped areas under paddy. The area under jowar is significant in all taluks of Surat district and in Mandvi, Mahuva and Valod taluks it covers 30 per cent. Jowar covers more than 10 per cent area in taluks of Baroda district. Nijhar taluk alone accounts for 52 per cent. Small millets occupy 18 per cent area in three taluks. Cotton is a major crop of the zone. Groundnut area in a number of taluks is about 10 per cent.
- 4.87 The relative yield index values of crops of Surat and Baroda districts are given in Table 21. Yield of rice in Surat is equal to the all-India average but that in Baroda only half of all-India. Kharif jowar yield is low in Baroda. Yield of jowar in Surat is well above all-India. The yields of small millets are very high. Yield of gram in Surat is of all-India level.
- 4.88 Male cattle and goats dominate in the zone. Male cattle account for about 30 per cent of the total livestock of various taluks. Sheep do not occur in significant number. Only in one taluk Kamrej, their percentage is 14. Female and young stock of cattle are nearly the same in humber and range between 10 and 20 per cent. The patterns are:

Taluk	Pattern
Nijhar Uchhal Songadh Vyara Mandvi	Cm <sub>3</sub> G <sub>4</sub> Cf <sub>4</sub>
Kamrej Palsana	G <sub>4</sub> Bf <sub>4</sub> Cm <sub>4</sub> Cy <sub>4</sub> /S <sub>4</sub>
Sankheda Tilakwada Nasavadi Chhota Udaipur Jambughoda	Cm <sub>3</sub> G <sub>4</sub> Cf <sub>4</sub>
Barodoli	Cm <sub>4</sub> G <sub>4</sub> Cy <sub>4</sub> Cf <sub>4</sub>

TABLE 21

Relative Yield Index of Principal Crops in Zone XII

Crop	Surat			
rice	93	51		
jowar (kharif)	118	68		
jowar (rabi)	169	206		
small millets	187	191		
gram	90			
groundnut	117	87		

Note: Relative Yield Index represents district yield expressed as percentage of the corresponding all-India average yield to 1968-69 tor 1970-71.

### Rainfall Zone XIII-- E<sub>4</sub> (A<sub>2</sub> B<sub>2</sub>) E<sub>4</sub>

4.89 The districts and taluks included in the zone and their cropping patterns are:

Cropping Pattern	Taluk	District
Pd <sub>3</sub> Pu <sub>4</sub> Jk <sub>4</sub> /R <sub>4</sub>	Gandevi Chikhli	} Valsad
Pd <sub>3</sub> Jk <sub>4</sub> R <sub>4</sub> Jk <sub>4</sub> C <sub>4</sub> Pd <sub>4</sub> Pu <sub>4</sub>	Bansda Navsari	) "

- 4.90 The area of the zone is 2,195 sq km. In Bansda taluk, the maximum elevation is 675 masl but the rest of the zone is at sea level. Deep or medium black soils predominate in the zone. Irrigated area is 40 per cent in Gandevi and about 20 per cent in Navsari. In other parts, irrigated area is negligible. The population density of the zone exceeds 300 per sq km. Gandevi has a density of 561 and Bansda of 201.
- 4.91 The taluks of Valsad district have 26 per cent area under forests and 6 per cent under barren and uncultivable land. Fallow lands are negligible; permanent pastures account for about 10 per cent in Navsari and Gandevi taluks. The net sown area varies between 50 per cent in Bansda and 85 per cent in Chikhli.
- 4.92 The zone receives an average rainfall of 150 cm annually in 60 to 75 rainy days. July is the month of maximum rainfall. In June and September rainfall is between 20 and 30 cm and in October it is 4 to 5 cm. This is an area where all the 4 months June to September receive more than 20 cm pm and two of them receive more than 30 cm pm.
- 4.93 The total cropped area of this zone is 110 thousand ha. The main crops are paddy, jowar kharif, cotton, other pulses occupying 35, 17, 13 and 10 per cent of the area respectively. Gram and tur together account for 5 per cent. Areas under ragi and wheat are 4 and 2 per cent respectively. The zone has three patterns two with paddy and one with kharif jowar in Navsari. In fact the difference in area between cotton and jowar is negligible and paddy area is also of the same order as jowar. Paddy is a dominant crop with an average of more than 30 per cent and jowar is significant though not of the same order. Cotton is predominant in Navsari and ragi is significant in Bansda taluk.
- 4.94 The relative yield index values of crops of the zone are given in Table 22. The yield of rice is the same as the all-India average. Yield of jowar (kharif) is 68 per cent of all-India value. The yields of ragi and wheat are about normal and that of cotton very good. The yield of jowar (kharif) is rather low being 68 per cent of all-India average.
- 4.95 Goats and male cattle dominate in this zone. Female buffaloes account for 21 per cent in Navsari 4—737Agri/76

and 18 per cent in Gandevi. The livestock patterns are:

Taluk		Patter <b>n</b>
Navsari Gandevi Chikhli Bansda	}	G <sub>4</sub> Bf <sub>4</sub> Cm <sub>4</sub> Cy <sub>4</sub> /S <sub>4</sub> Cm <sub>4</sub> G <sub>4</sub> Cy <sub>4</sub> Cf <sub>4</sub> Cm <sub>4</sub> Cf <sub>4</sub> G <sub>4</sub> /Cy <sub>4</sub>

TABLE 22

Relative Yield Index of Principal Crops in Zone XIII

	Area '000 ha	Percent of gross Cropped area per cent	RYI•	
paddy	84	26 · 3	99	
jowar (kharif)	17	5 • 2	68	
ragi	17	5 • 4	92	
wheat	2 · 8	0.9	112	
cotton	17	5 -3	144	
other pulses	20	6 •0	86	

<sup>\*</sup>RYI represents Valsad district yields expressed as percentage of the corresponding all-India average yields for 1968-69 to 1970-71.

### Rainfall Zone XIV—E<sub>4</sub> (A<sub>3</sub> B<sub>1</sub>) E<sub>4</sub>

4.96 The district and taluks included in the zone and their cropping pattern are given below:

Cropping pattern Pd <sub>1</sub> Pd <sub>2</sub> Fr <sub>4</sub> Pd <sub>3</sub> Jk <sub>4</sub> Pu <sub>4</sub> /R <sub>4</sub>	Taluk	District		
Pd <sub>1</sub>	∫ Umbergaon Pardi Valsad	Valsad		
Pd <sub>2</sub> Fr <sub>4</sub>	∢ Pardi	**		
	( vaisau	**		
$Pd_3 Jk_4 Pu_4/R_4$	Dharmpur	**		
R <sub>3</sub> Mt <sub>4</sub> O <sub>4</sub> Pd <sub>4</sub>	Ahwa	Dangs		

- 4.97 The area of the zone is 4,632 sq km. Ahwa taluk of Dangs district and Dharmpur taluk of Valsad district have each areas of about 1,680 sq km. Areas of the remaining three taluks of the zone are between 360 and 510 sq km. Dharampur and Dangs are elevated areas. In Dangs the highest elevation is between 300 and 1,000 masl but in Dharampur maximum elevation is 682 masl. The remaining three taluks are practically at sea level. The soils are deep or medium black and irrigated area is negligible. Dangs taluk has the lowest population density of 56 per sq km. while that of Dharampur is double Population density in the remaining of this value, part of the zone ranges between 320 and 440.
- 4.98 Dangs has 70 per cent of the area under forests leaving the net sown area of only 20 per cent. Dharampur has also good proportions of forest area and the net sown area in this taluk is 33 per cent. In the three remaining taluks of the zone, the net sown area ranges from 70 to 85 per cent. Follow land, pastures, etc.. are negligible.

- 4.99 Dharampur taluk receives the heaviest rainfall of 240 cm annually followed by Dangs receiving 200 cm rainfall. July is the month of maxmium rainfall. July and August together account for 60 to 70 per cent of the annual total. July average rainfall is 70-75 cm. June and August get between 30 and 40 cm and the average for September is 25 cm.
- 4.100 Ragi predominates in Dangs and occupies nearly one-third of the cropped area. Dharampur also has to some extent ragi like Dangs but paddy predominates in the rest of the zone. In Umbergaon, paddy occupies 84 per cent of the cropped area. The cropped area of the zone is 145 thousand ha, which represents less than 2 per cent of the gross cropped area of the State. Two-thirds of the cropped area occurs in Dangs and Dharampur. The averages for the zone are paddy 37, ragi 19, small millets 11, gram 6, tur 5 and other pulses 5 and other oilseeds 6 per
- cent. The cropping patterns centre round paddy and ragi. Only in Dangs, the pattern inculdes also small millets. Elsewhere paddy predominates.
- 4.101 Paddy yield in general is practically the same as all-India average but in Dangs district, the yield of paddy is only 61 per cent of the all-India value. Ragi yield in Dangs is 92 per cent of all-India.
- 4.102 Cattle and goats predominate in theis zone. The two patterns are:

Taluk	Pattern
Dangs Dharampur Umbergaon Pardi	$\left\{ \begin{array}{l} Cm_4 \ Cf_4 \ G_4/Cy_4 \end{array} \right.$
Valsad (Bulsar)	$\left\{  Cm_4G_4\;Cy_4\;Cf_4 \right.$

## 5 GENERAL OBSERVATIONS FOR FUTURE CROPPING PATTERNS

### General

- 5.1 In the foregoing sections we have dealt with in cropping and livestock patterns detail the rainfall, which emerge from the existing information. We have also categorised the rainfall patterns into zones and discussed how the other patterns feature in those zones. Among other information that on soils, which ought to play an important role in determining cropping patterns, is lacking in such details as are wanted for this analysis. Data on orography and population density have featured in this analysis but their exact role on cropping and livestock patterns coud not be brought out owing to lack of detailed informa-We are, however, convinced that studies and analysis indicated in the preceding sections are important for the guidance they may give in deciding cropping and livestock patterns vis-a-vis rainfall patterns. The greater the accuracy of the primary information, and the more detailed such information is, the more useful the data would be in drawing up the most efficient cropping and livestock patterns in an area or a zone. With this purpose in view the following procedures are suggested :-
  - (i) Delineation of rainfall zones;
  - (ii) Identification of the existing cropping patterns;
  - (iii) Assessment of area needed for each crop and its ideal distribution;
  - (iv) Comparison of (iii) with (ii) in order to determine possible changes; and
  - (v) Consideration of other related factors like soil, irrigation facilities, density of population livestock patterns and then arriving at the future cropping patterns.
- 5.2 The methods of delineating rainfall patterns or zones and cropping patterns have been fully discussed in Section 2. For the purpose of locating suitable areas

- for a crop, soil and topography of the land are important factors. The approximate area to be put under each crop will be decided by the demand for it not only at a State level but at the national level, either for internal consumption or for the purpose of export. The Departments responsible for crop planning of a State should, therfore, be cognisant of the demand for a crop, so that production efforts are not rendered futile because of lack of demand and marketing. We have already discussed the part each of the factors mentioned in item (v) of para 5.1 is likely to play in deciding cropping patterns. For this purpose not only detailed data but also knowledge about the correlation between these factors and crop performance would be necessary. Knowledge gained, through long experience, by farmers would also be most helpful.
- 5.3 It may be mentioned that the rainfall intervals which form the basis of identifying rainfall patterns are subject to minor modifications. Thus, the condition that 30 cm of rainfall for three consecutive months is good for paddy may not be rigorously adhered to. If the soil is favourable with a high water retention capacity or, what is more important, water management is efficient with an eye to economise water use, rainfall lower than 30 cm for three months may sustain a good crop of paddy.
- 5.4 The choice of a cropping pattern is not decided by the farmer only on technical grounds. He is also guided by the profitability of the crops or requirements for his household consumption. Farmers may not be inclined to accept a crop unless the necessary inputs and infrastructure are assured. Of all the inputs water is the most important as is made evident by the spread of groundnut in the country, sugarcane in Gujarat, maize and cotton in Karnataka and recently of wheat in West Bengal. These are excellent instances of the manner of introduction of new crops in the cropping patterns of a State or a region.

### Some observations Pertaining to Gujarat State

- 5.5 Yield levels of many crops in the State are well above all-India averages. There is scope for increasing the same further. Some specific aspects as mentioned below need looking into.
- 5.6 The State takes both kharif and rabi jowar. Rabi jowar is mainly confined to the southern districts and Saurashtra. The yields of jowar are generally poor. Crop is reported to be taken for dual purpose of getting grain as well as fodder in some areas. The places where it is grown solely for grain, there is no reason why yields should be low. Soil moisture is not a limiting factor where grain crop is taken. Possibilities of increasing yields by increasing plant population per hectare needs special attention.
- 5.7 Groundnut is a very important crop in the State accounting for 25 per cent of the all-India area under it. About 80 per cent of the groundnut area in the State is confined to Saurashtra region. The crop is mostly taken rainfed. There are years when its performance is satisfactory giving about 10
- quintals of yield per hectare, but in other years, the yields are very low. During the period 1967-68 to 1971-72, the variation in yields has ranged between 4.5 and 10.44 quintals per ha. The rainfall in the months of July and August in the Saurashtra area is either A1 C1 or B1 C1 or C2 categories. In some of the other parts of the State, it is even of A1 B1 category. There is likelihood of the crop suffering from excess moisture and weed growth in the initial stages of crop growth period wherever A or B type of rainfall occurs in other months, rainfall cannot be said to be adequate, particularly in the years of low rainfall. It is, therefore, suggested that the problem be studied in great detail with a view to stabilising groundnut production. Possibilities of replacing some area with sunflower may also be examined.
- 5.8 Parts of Banaskantha and Mehsana districts experience the same desert conditions as are prevalent in western Rajasthan. However, the State Government is trying to provide irrigation facilities on an increasing scale in the affected parts. Accordingly, cropping patterns applicable to irrigated areas will have to be developed even for these districts.



APPENDIX 1

Talukwise Land Use (1968-69) and Population Statistics

GUJARAT

(Area in thousand hectares)

District/taluk	Population .	1971	Forests	Nac	Cw	pp≷	Mtc & g	Fallow	Net
Districtfiatur	Total	Per q km.	1010010	1.00	<b></b>	thousand hectares		lands	area sown
* *************************************	Rainfall <b>Z</b> o	ne-I				Ra	infall Pati	tern—B4(C	$D_1E_2)E_4$
Kutch									
Mundra	57079	64	<b>—(—</b> )	2(2)	6(7)	1(1)	<del>()</del>	13(15)	44(49)
Anjar	143133	109	( <del></del> )	1(1)	10(8)	9(7)	<del>-(-</del> )	8(6)	78(59)
Abdasa	74165	31	()	1(1)	46(19)	11(5)	<b>—(—</b> )	10(42)	3(1)
Rapai	99173	33	<b>—(—</b> )	3(1)	35(12)	<b>—(—</b> )	2(1)	92(31)	108(36)
Bhachau	79016	40	<del>-(</del> )	5(2)	13(7)	2(1)	2(1)	47(23)	94(47)
Lakhpat	21960	11	<b>—(—</b> )	1(1)	<b>16(8)</b>	<b>—</b> ( <b>—</b> )	<b>—(—</b> )	44(22)	1(ng)
Bhuj	167443	37	<b>—(—</b> )	2(1)	20(4)	57(13)	<b>(</b> )	12(3)	78(17)
Mandvi	115546	81	<b>—(—</b> )	5(4)	16(7)	6(4)	()	3 <b>9(2</b> 9)	37(26)
Kutch									
Nakhatrana	92254	47	()	2(1)	9(4)	-()	<b>—(—)</b>	15(7)	47(23)
Jamnagar									
Okhamandal	<b>7680</b> 8	107	<b>-(-</b> )	9(13)	13(19)	5(6)	<del>(</del> )	12(17)	24(33)
Kalyanpur	91 <b>59</b> 5	65	()	2(1)	3(2)	10(7)	()	5(3)	83( <b>59</b> )
•	Rainfall .	Zone—1		3-		Rainfall Pattern-			$(C_1D_3)E_4$
Amreli									
Liliya	48003	122		1(3)	-	4(10)		1(3)	32(81)
Lathi	8 <b>269</b> 4	131		neg(neg)	2(3)	6(9)	_	neg(neg)	52(82)
Khambha	35711	88	131	1(2)	2(5)	4(10)	_	neg(neg)	25(61)
Dhari	99935	91	1 124	2(2)	2(2)	6(5)	-	12(11)	74(68)
Amreli	140496	169		3(4)	1(1)	4(5)		3(4)	71(85)
Babra	72383	91	1	3(4)	1(1)	4(5)		1(1)	58(73)
Bhavnagar									` `
Savarkund <sup>l</sup> a	164388 ገ								
Savar Kunu-a	•	142		4(2)	2(1)	30(18)		7(4)	122(74)
Gariadhar	69662		सन्दर्भव	नगर्न					
	Rainfall <b>Z</b> a	ne <b>11</b> 1	••		• •	R	ai <mark>nfall P</mark> a	ttern—E <sub>4</sub> (C	$E_2D_1E_1)E_4$
Mahesana				_					
Chanasma	174284	197	<b>—(—</b> )	4(5)	2(2)	8(9)	<b>-(-</b> )	1(1)	72(81
Harej	<b>5</b> 5 <b>1</b> 61	136	<b>—</b> (—)	Neg(1)	1(3)	4(10)	<del>-(-)</del>	3(7)	31(75)
Saini	97858	65	<b>—(—</b> )	2(1)	30(20)	11(7)	<del></del> ()	2(1)	95(63)
Jamnagar Jadiya	75140	86	( <del></del> )	2(2)	2(2)	6(7)	<b>(</b> )	6(7)	51(58)
Banaskantha			` '	. ,		. ,	• •	-4.7	(,
Vav	97262	57	()	2(1)	4(2)	6(4)	<b>—(—</b> )	32(19)	98(58
Tharad	109058	80	<del>-(</del> )	3(2)	2(2)	13(10)	—( <del>`</del> —)	4(3)	108(80
Deodar	107179	106	-()	7(7)	1(1)	2(2)	·()	1(1)	86(84)
Santhalpur	55652	41	— <u>(</u> —)	2(1)	16(12)	4(3)	()	37(28)	57(42)
Dhanera	108432	91	<b>–(–</b> )	1(1)	1(1)	11(9)	()	6(5)	86(73
Radhampur	63572	107	()	2(3)	1(2)	1(2)	<del>(</del> )	12(21)	43(72
Kankrej	116468	142	<b>−(−</b> )	1(1)	1(1)	2(2)	<b>-(-</b> )	<b>—(—</b> )	70(85

<sup>=</sup> nil or negligible

Nac = not available for cultivation

Cw = culturable waste

Pp&gl = permanent pastures and other grazing lands

Mtc&g = miscellaneous tree crops and groves not included in net area sown

Note: Figures in brackets represent percentages to total reporting area

### APPENDIX 1 (Contd.)

District/taluk	Population 1971	_	Forests	Nac	Cw	Pp≷	Mtc&g	Fallow	Net area
	Total Per sq km				thous	thousand hactares		lands	sown
	Rainfall Zone — II		<i>IV</i>				Rainfall Pa	ttern—E <sub>4</sub> (	$C_2D_2)E_4$
Surendranagar									
Sayla	50545	52	<b>—(—</b> )	2(3)	1(1)	4(4)	<b>—(</b> —)	7(7)	55(57)
Dasada	113765	70	<del>-</del> ()	1(neg)	4(3)	12(7)	<del>-(-)</del>	8(3)	108(66)
Limbdi	152761	89	-(-)	10(6)	14(8)	neg(nep)	<del>-(-)</del>	9(5)	119(69)
Wadhwau Muli	160758 57414	202 61	—(—) —(—)	1(2) 3(3)	0·4(1) 3(3)	6(7) 5(5)	—( <del>—</del> )	3(4) 3(3)	62(78) 55(59)
Bhavnagar									
Umrala	54219	133	<del>-(-</del> )	1(3)	1(1)	5(13)	<b>(-</b> )	10(25)	21(52)
Gadhada	90367	101	<b>—(—</b> )	4(4)	6(6)	6(6)	<del>-(-)</del>	6(7)	62(69)
Sehor	98412	137	<b>—(—)</b>	4(6)	6(8)	5(7)	<b>—(—</b> )	<b>-</b> ( <b>-</b> )	48(66)
Vallabhipur	48416	82	()	4(1)	2(3)	4(7)	<del></del> ( <del></del> )	7(11)	40(67)
	Rainfall Z	one—V		•	••	Ra	infall Pett	ernE <sub>4</sub> (B <sub>1</sub> (	$C_1E_2$ ) $E_4$
Jamnagar									
Bhanvad	76124	104	<u> </u>		1(2)	5(7)	<b>—(-</b> -)	1(2)	43(59)
Jamjodhpur	97236	90	$A = (-)^{-1}$	4(4)	1(1)	11(10)	2(2)	1(1)	<b>59(55</b> )
Kalavod	101604	82 <	<b>-(-</b> )	2(1)	neg(neg)	10(8)	<b>—(—</b> )	<del>()</del>	80(65)
Khambhaliya	115448	95	-(-)	4(3)	2(2)	8(6)		5(4)	73(60)
Lalpur	72142	67	<del>-(-)</del>	2(2)	1(1)	7(7)	<del>-</del> ()	15(14)	<b>59(5</b> 5)
Jamnagar	360133	294	<del>-(-)</del>	1(1)	3(3)	7(6)	neg(neg)	11(7)	68(5)
Dhrol	45118	79	<del>-(-)</del>	1(2)	0 ·4(1)	5(8)	<b>—</b> ()	neg(neg)	40(67)
Junagadh			ALC: A	Maria .					
Una	169256	108	-()	4(2)	<del>()</del>	(1 <b>5)</b> 9	<del>(</del> )	2(1)	65(41)
Bhesan	49175	112	<b>—</b> (—)	-1(2)	( <u>-</u> )	6(14)	<del>-(-)</del>	( <del>-</del> -)	34(79)
Visava:lar	90276	100	-(-)	3(3)	1(1)	11(13)	-()	0 .4(4)	51(57)
Patan Veravat	191308	278	न-प्रस्थ	7(10)	0 ·4(1)	8(12)	<b>—</b> ( <b>—</b> )	2(3)	40(67
Junagadh									
Ranavav	60589	103	<del>-(</del> )	1(2)	1(1)	8(14)	<b>—(</b> )	2(3)	24(42)
Kutivana	67981	120	<b>—(—</b> )	2(4)	<b>(</b> )	13(23)	<b>—(—)</b>	4(7)	34(60)
Porbandar	225524	198	—(—)	3(3)	2(2)	18(16)	4(4)	13(11)	58(51)
Amreli									
Kodinar	105759	203	<b>—(—)</b>	5(11)	3(7)	1(2)	<del>-(</del> )	\-,	35(67
Rajula	101093	119	( <del></del> )	1(1)	1(1)	7(8)	—(—)		61(72)
Jafrabad Kunkavav-Vadia	42039 120617	119 145	-(-) (-)		neg (neg) neg (neg)	3(10) 7(9)	<b>()</b> <b>()</b>	() ()	26( <b>7</b> 3) 7 <b>0(8</b> 4)
Rajkot								` '	- ( - 1)
Dhoraji	119357	247	<b>-(-</b> )	1(2)	neg (neg)	7(15)	<del></del> ()	1(2)	38(79)
Jetpur	126544	186	<del>-(-)</del>	1(2)	—(—)	6(9)	—(—)	—( <del>_</del> )	51(75)
Jam-Kandorna	52659	93	<u>~(~)</u>	1(2)	1(2)	5(10)	<del>-</del> ()		42(74)
Gondal	176463	148	<b>–</b> (–)	9(8)	neg (neg)	18(15)	—( <del>_</del> )		82(68)
Lodhika	29966	80	~ <del>(</del> ~)	3(9)	-()	3 (8)	<u>~(~)</u>	1(2)	23(62)
Paddhari	51229	79	<u>()</u>	7(10)	0.4(1)	6(9)	<u>~(~)</u>		43(67)
Kotnasngani	40502	91	—(—)	1(2)	1(2)	7(15)	<b>—(</b> —)	3(6)	31(68)
Upleta	137793	174	( <del></del> )	2(3)	4(1)	11(14)	-(-)		57(72)
Rajkot	392084	371	-(-)	8(6)	2(2)	8(7)	<b>—(—</b> )	3(3)	65(55)
Jasdan	131792	<b>9</b> 9	( <del></del> )	11(9)	4(3)	4(3)	<del>-(-)</del>	1(1)	87(66)
Mor. vi	203521	120	()	5(3)	neg (neg)	11(6)	<b>-</b> ()		1227(3)
Wankaner	103391	93	<b>-(-</b> )	3(3)	6(5)	17(15)	-(-)	4(4)	<b>56(5</b> 0)
Maliya	58771	76	<del>-(-)</del>	6(7)	<del>(</del> )	2(3)	—(—)	(2)	<b>\$0</b> (65)

### APPENDIX 1 (Contd.)

District/taluk		Population	1971 F	Forests	Nac	Cw	Pp≷	Mtc&g	Fallow lands	Not are sown
		Total Per sq	km			thou	sand hacta	res		
		Rainfall 20	neV(C	Contd.)				Rainfall Pa	attern—E <sub>4</sub> (B	$C_1C_1E_2)E_4$
Surendranagar										C=145
Ghotila		77082	73	<b>(</b> )	neg (neg)	4(3)	5(5)			
Lakhtor		50905	69	· ()	3(4)	0 ·4(1)	3(4)	<b>—(</b> )		60(81
Halvad		71485	139	<del>()</del>	1(1)	4(3)	7(10)	<b>(</b> )		81(66
Dhrangadhra		110739	81	()	3(2)	neg (neg)	6(4)	-	9(6)	88(65
Mahesana						-				
Patan		254117	243	~~·(~~)	8(8)	1(1)	11(10)	neg (neg)	1(1)	84(80
		234868	350	-(-)	1(2)	2(4)	8(13)	<del></del> ()		52(78
Sidhpur		205821	216	<u>    (                                </u>	4(4)	4(4)	8(9)	2(2)		69(73
Kheralu		246212	311	<u> </u>	4(5)	1(2)	5(6)	-(-)		67(84
Mahesana		240212	311	_()	4(3)	1(2)	2(0)	,	- (-)	
Banaskatha					2(2)	1(2)	1.(2)	4/6\	5(0)	41 (72)
Vadgam		112630	199	()	2(3)	1(2)	1(2)	4(6)	5(9)	41 (73)
Ahmadabad										
Viramgam		237832	139	<del>()</del>	1(1)	5 (3)	2(1)	<b>—(—)</b>	4 (2)	140 (82
, 11 (1.1.Bu				•			•	Dainfall P	attern—E4(E	C.F.F
		Rainfall Z	one—VI	• •	• •	••		Kamjan Fi	111ern — 64(£	10 2E1)E.
Bahaynagar					4/4:	4/4	4765		0/10\	50/75
Botad		93244	124	-	2(3)	3(4)	4(6)		8(10)	53(70
Palitana		105874	144		3(4)	1(1)	7(9)	-(-)		40(55
Bhavnagar		298745	204	C Cas	7(5)	9(6)	1(1)	<b>—(—</b> )		36(25
Ghogha		48976	112	حث ا	2(6)	I(1)	3(8)	<del>()</del>		30(69
Talaja		136906	157	° 41,	1(1)	3(5)	10(11)	()	3(3)	64(74
Mahuva		196075	161		1(1)		18(15)	()	4(3)	90(73
					8137					
Mahesana		200316	100	TAN	3(2)	0.4(1)	11(12)	neg(neg)	neg(neg)	78(83
Vijapur		308216	328	1/1/1/2		0.4(1)	3(7)	0.2(1)		42(86
Visnagar		160729	329		3(5)					41(83
Kalol		172533	354		4(8)		2(4)	neg (neg)		
Kadi		18 <b>26</b> 74	220		6(7)	3(3)	4(4)	1(1)	1(2)	69(83
Ahmadabad			1	the Section						
Dehgam		150738	243		0.1(1)	1(1)	3(4)	<del>()</del>	1(1)	50(80
Dhandduka		181166	67	CHARLE THE	2(1)	9(3)	3(1)	<del></del> ()	23(9)	163(60
Dholka		226577	131	14.34.64	司司 <sup>2(1)</sup> 1(1)	5(3)	2(1)	-()	5(3)	126(73
		113787	142		1(1)		1(1)	()		62(78
Sanand		115.0.			- 🗸 🗸		• /	, ,	•	•
Vadodara			170		1/1\	4(5)	5/7\	1(1)	neg (neg	50(63
Jambugam		13 <b>775</b> 6	172	-	1(1)	4(5)	5(7)	1(1)	neg (neg	5) 20(03
Gandhinagar										
Gandhinagar		200642	309	_	5(8)	2(3)	6(9)	<del>-</del> (	2(3)	51(77
Kheda		221139	185	_	9(1)	4(3)	3(3)	-()	3(3)	68(5)
Gambay					/(-)	.(0)	-(-)			
		Rainfall Z	one-VII	- •	• •	• •		Kainjau	Pattern-	E4(B2E2)E
Banaskantina							1.440		A/41	4 4
Deesa		195443	132		2(1)	1(1)	14(9)	_	2(1)	115(77
Palanpur		228944	219		4(4)	1(1)	18(17)	neg (neg)	3(3)	77(73
Danta		7 <b>074</b> 3	83		2(2)	neg(neg)	l(1)	•	_	18(21
Sabarkantha		98559	117		1(1)	7(8)	2(2)		6(7)	36(42
Khedbrahma			1.,		-(-)		_(-)	Painfail	Pettern—E	
	Rainfall Zone	VIII	••	•	•	••		Ranjan	renern—E	4(D6C2)E
Panchmahals			105		0.2/1)	2(4)	6(11)	<b>(</b> )	3(5)	29(5
Shehera		113259	195		0.3(1)					
Limkheda		163016	153		1(1)		8(7)	( <del></del> )		43(4
Dohad		2 <b>3592</b> 8	270		8(9)		7(8)	~ <b>-(</b> )		48(5
Jhalad		158860	199		2(3)		2(3)	-()		48(6
Lunavada		186251	197		1(1)	2(2)	3(3)	<b>—(-</b> )	2(3)	57(6
Vadodora							7(9)	(- <del></del> )		62(78
A MITOGOLSI		161022	203		(2)3	1(1)			1(1)	

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### APPENDIX 1 (Contd.)

7N:	Population	1971			Cw	Pp≷	Mtc&g	Fallow	Net area	
District/taluk	Total per	sąkm	Forests	Nac	thousa	nd hactares	lands	Fallow lands	Net area	
	Rainfall 2	zone—IX					Rainfall	Pattern—E	$_4(A_1C_3)E_4$	
Junagadh										
Manavadar	108284	183		3(5)	neg (neg)	7(11)		1(2)	47(61)	
Keshod	105273	187		4(7)	neg (neg)	10(18)			39(10)	
Malia	87017	161	_	1(3)	neg (neg)	13(24)	1(2)	1(1)	33(61)	
Talala	72743	76		3(3)	5(5)	12(13)	-(-,	2(2)	24(25)	
_	46948	129		2(5)	-(-)	2(6)	<b>—</b> ( <b>—</b> )		24(65)	
Mendakda	81326	207		4(9)	neg (neg)	2(6)	<del>()</del>	3(7)	31(78)	
Vanthali	193709	286	_	4(6)	neg (neg)	2(4)	<del>-(-)</del>	3(5)	37(55)	
Janagudh Mangrol	107268	189	_	2(3)	4(1)	7(12)	—(—)	1(2)	41(73)	
C.ma.										
Surat	645827	1108		1(2)	neg(neg)	3(6)	<b>—(-</b> -)	2(4)	36(63)	
Ghorasi	98407	143		2(3)		6(9)	neg (neg)			
Olpad	90407	143		2(3)	neg(neg)	0(9)	neg (neg)	1(1)	45(65)	
Bharuch										
Amod	68 <b>664</b>	148		3(6)	neg(neg)	1(2)	<b>—(—)</b>	0.3(1)	38(82)	
Jambnsar <sup>,</sup>	140355	128	_	4(3)	3(2)	5(4)	<b>—(—</b> )	1(1)	67(61)	
Vagra	65037	74	_	1(1)	1(1)	2(2)	<b>—</b> (—)	1(1)	52(59)	
Bharuch	223537	336	723	7(10)	1(2)	3(5)	—( <del>_</del> )	1(2)	53(79)	
Hansat	45231	113		(2)5	0.2(1)	2(5)	<b>—(—</b> )	1(2)	24(61)	
Ankleshwar	97297	235	7 3 10 10	(2)5	0.3(1)	1(3)	<b>-(-</b> )	1(3)	34(81)	
Ankieshwar		14			0 3(1)					
Kheda	Rainfall Zo	ne—X			••	Ka	injali Patt	$ern-E_4(A_1)$	$B_1C_1E_1) E_4$	
Mehmedabad	173152	348	-(-)	6(12)	neg (neg)	3(6)	<del>(-</del> )	1(2)	40(80)	
Nadiad	376627	568	165	7(11)	0.4(1)	2(3)	—( <del>`</del> —)			
Kapadranj	269764	274	(	11(12)	1(1)	6(6)	()			
Sabarkantha		4		772						
Vijaynagar	43378	95	<del>-</del> ()	0:4(1)	1(2)	1(1)	<del>-(-)</del>	1(2)	10(22)	
Bhiloda	114190	158	<del>-(-)</del>	3(4)	0 ·4(1)	1(2)	<b>—(—</b> )	14(20)	35(48)	
Meghraj	69095	127	-(-)	2(4)	2(4)	neg(neg)	<b>—(—)</b>	-(-)	33(60)	
Prantij .	182949	222	<b>—(—)</b>	1(1)	1(1)	6(7)	—( <u>—</u> )		62(74)	
Himatnagar	143649	186	<b>—</b> (—)	1(1)	1(2)	6(8)	—( <u>—</u> )		51(66)	
Modasa	153409	177	—( <u>—</u> )	1(1)	3(3)	6(7)	<b>(</b> )	3(3)	59(68)	
	50527	137	<u>~(~)</u>	0.4(1)	2(6)	2(6)	<b>—</b> (—)	1(3)		
Malpur	137517	187	<del>-</del> ( <del>-</del> )	1(1)	1(1)	1(2)	—( <del>_</del> )		22(59)	
Bagad Idar	194364	171	—( <u>       )</u>	2(2)	1(1)	7(6)	<del>(</del> )		61(83) <b>84(</b> 74)	
Panchmahals										
Ahmadabad	1803085	6289	<b>—(—</b> )	1(5)	1(4)	0 ·1(1)	<b>—(—</b> )	3(10)	11(38)	
Darkroi	197622	283	<del>-(-)</del>	1(1)	2(3)	6(8)	<del>-(</del> )			
	Rainfall	Zone—XI	• •				Rainfall Pa	nttern—E <sub>4</sub> (2	$n-E_4(A_1B_1C_2)E_4$	
Kheda										
Matar	132084	229	_	8(14)	0 •4(1)	3(5)	_	1(2)	45(78)	
Barsad	301054	494	_	7(12)	1(1)	2(3)				
Petlad	256693	541		1(1)	1(1)	1(2)		1(2)		
Thasra	190285	288		9(14)		4(7)		_		
Balsinor	131513	238		8(14)	1(1)	2(2)		0·3(1)		
Anand	399096	590	-	9(13)	0.3(1)	2(3)	_	1(1)		
Pauchmahals										
Santrampur	247300	182		8(6)	4(3)	neg (neg)		6(9)	69(50)	
Godhra	269357	264		0.4(1)	3(3)	6(6)		5(5)		
Devgad Baria	219373	192	_	8(7)	4(3)					
TA 1 Dec	118273	297		2(6)	1(4)	1(2)	-(-)			
Kalol	1104/3	40		2(0)	1(7)	1(4)	_,_,	11.7.1		

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### APPENDIX 1 (Concld.)

District/taluk	Population	on 1971	Forests	Nac	Cw	Pp & gl	Mtc & g	Fallow	Net area	
Diacificificatur	Total I	er sq km	1.016212	1440	tho	usand hacta	ıres	lands	Net area	
	Rainfall Z	one—XI (C	Contd.)			Ra	infall Patte	$ern-E_4$ ( $A_1$	$B_1$ $C_2$ ) $E_4$	
Bharuch									•	
Sagbara	52576	131	_	1(3)	neg (neg)	1(3)	<del></del> ()	11(27)	26(66)	
J <b>haga</b> dia	120,000	148	_	2(3)	1(1)	4(5)	<del></del> ()	1(2)	<b>49(</b> 61)	
Valia	80927	157	_	4(8)	neg (neg)	3(6)	neg (—)	0 ·4(1)	41(79)	
Nandod	148294	131	_	14(13)	1(1)	3(3)		neg (neg)	51(45)	
Dediapada	67683	66	_	3(3)	2(2)	2(2)	<del>()</del>	neg (neg)	24(24)	
Surat										
Mangrol	128904	165	_	1(1)	1(1)	9(12)	0 -3(1)	0 ·4(1)	61(78)	
Vadodara										
Sinor	56656	194		2(6)	neg (neg)	3(10)	<del>()</del>	<del></del> ()	24(82)	
Dabhoi	145160	229	_	2(3)	0 ·4(1)	7(11)	<del></del> ()	neg (neg)	53(83)	
Kargan	114782	191	_	0 ·4(1)	ncg (neg)	6(10)	<b>—(—</b> )	0.4(1)	52(86)	
Vaghodia	89269	158		3(4)	neg (neg)	8(15)	-(-)	0 ·3(1)	42(75)	
Vadodara	665306	993	-	8(11)	1(1)	4(5)	—(`—)	2(4)	51(75)	
Padra	171308	320		5(10)	1(2)	1(3)		neg (neg)	41(76)	
	Rainfall 2	Zone—XII					ainfall Patt			
Vadodara	•									
Sankheda	133676	185	_	3(5)	neg (neg)	6(8)	1(1)	neg (neg)	56(77)	
Tilakwada	43542	178		2(8)	1(3)	2(7)	<b>—</b> ( <del>—</del> )	1(2)	19(78)	
Nasvadi	72661	136		-2(4)	4(1)	4(7)	0 ·3(1)	neg (neg)	41(56)	
Chhota Udaipur	188927	137		9(6)	6(5)	17(12)	<del>-(-)</del>	3(2)	63(56)	
Panch Mahals		,			` '	` ,	,	- ()	()	
Jambughoda	21513	147	33 3	<b>—(—</b> )	2(10)	1(6)	<del>-(-)</del>	1(7)	5(39)	
Surat										
Songadh	135095	158		1(1)	neg (neg)	5(6)	1(1)	2(2)	42(49)	
Vgara	153536	189	1/14/	2(3)	<b>—(—</b> )	2(2)	2(3)	1(1)	49(60)	
Palsana	53170	265		1(6)	()	1(5)	<b>—(—</b> )	0.2(1)	18(88)	
Mahuva	82049	232	Date of the last	1(3)	1(2)	1(4)	2(1)	0.2(1)	28(78)	
Valod	51999	257	1377	4(2)	neg (neg)	1(6)	<del>-(-)</del>	0.2(1)		
Mandvi	119168	163		1(2)	1(2)	0 ·3(1)	`	2(3)	44(61)	
Nizar	71932	180		1(2)	<del>-</del> ()	3(8)		1 (neg)	31(78)	
Uchhal	44940	139	44.7	1(2)	0 ·4(1)	1(3)	_	2(6)	13(42)	
Kemrej	81777	216	_	1(1)	<del></del> ()	1(2)	<b>—(—</b> )	1(1)	32(43)	
Bardoli	120120	317	_	0.3(1)	()	3(7)	<del>-(-)</del>	1(3)	32(83)	
	Rainfall Z	one—XIII	• •		• •	• •	Rainfal	l Pattern—]	$E_4(A_2B_2)E$	
Valsad										
Gardevi	159483	561	_	1(3)	<b>—(—</b> )	3(11)		1(3)	17(63)	
Chikhli	176089	306	••••	(neg)	<b>—(—)</b>	3(5)	_	1(2)	49(85)	
Bansda	120169	201		1(2)	<b>—(—</b> )	2(3)	_	1(2)	30(50)	
Navsari	276425	376	_	1(2)	neg (neg)	5(8)	_	1(1)	47(64)	
	Rainfall Z	one—XIV				••	Rainfaii Pa	uttern—E <sub>4</sub> (.		
Valsad	<b>y</b> =		• •	• •	• • •	* *		4 (	-5 -1 /4	
Umbergaon	116866	323	_	0 ·4(1)	0 • 2(1)	2(6)	<b>—(—</b> )	1(2)	25(69)	
Pardi	162465	380	_	1(2)	<del>()</del>	1(2)	<u> </u>	1(3)	36(84)	
Valsad	223084	438	_	2(4)	0.3(1)	1(3)	<del>()</del>	1(3)	38(75)	
Dharampur	193711	117	_	1(1)	14(8)	2(1)	<del>-(-)</del>	2(1)	<b>55(3</b> 3)	
The Dangs			100/-0							
(Ahwa)	94185	56	100(58)	13(7)	3(2)	0 ·4(2)	<b>—(—</b> )	7(4)	51(29)	

APPENDIX 2 Talukwise Livestock Population-. 1966 **GUJARAT** 

			GOJA		<u>L</u> .					(t	housan	ds)	
District/taluk	Cati	le	В	uffaloe	es	Sheep	Go- ats	Hor- ses	Mu- les	Don- keys	Ca- mels	Pigs	Total live-
	Male Fema	ale Young stock		Fe- male	Young stock			& ponies					stock
	Rainfa	ll Zone-	-I .					<i>I</i>	Rainfall	Patte	rn—E <sub>4</sub>	$(C_1B_1.$	$E_2$ ) $E_4$
Kutch Mundra	6 (10)	11 11 (16) (16)		(3)	2 (3)	18 (27)	16 (24)	(—)	 ( <del>_</del> )	1 (1)	()	 (_)	68
Anjar	10	14 15 (15) (17)		(2)	(1)	26 (28)	23 (26)	( <del>_</del> )	()	<u> </u>	(—)	( <del>_</del> )	90
Abdasa	12	26 26 (18) (18)	· -	(2)	(2)	28 (20)	44 (30)	(—)	(—)	(1)	(1)	(—)	145
Rapar	16	16 12 (12) (9)		7 (5)	(3)	45 (32)	36 (27)	( <del>-</del> )	( <del>-</del> )	(1)	1 (1)	( <del>-</del> )	138
Bhachan	10	12 9 (13) (10)	-	(6)	(4)	24 (26)	26 (28)	()	(—)	(1)	(1)	( <del>-</del> )	92
Lakhpat	4	16 10 (26) (16)		3 (5)	(3)	4 (7)	21 (34)	( <del>-</del> )	( <del>-</del> )	( <del>-</del> )	1 (2)	<u>(–)</u>	61
Bhuj	13	31 23 (18) (13)		12 (7)	6 (4)	34 (20)	49 (28)	1 (1)	( <del>-</del> )	1 (1)	2 (1)	— (—)	172
Mandvi	10	18 19 (16) (17)	-	100h 3	2	27 (25)	31 (28)	( <del>_</del> )	( <u>—</u> )	(1)	(—)	( <del>_</del> )	110
Nakhotara	10	17 15 (16) (14)		7 (7)	(5)	10 (9)	40 (38)	( <del>_</del> )	()	(1)	(1)	( <del>-</del> )	106
Jamnagar Okhamandal	9	8 8 (16) (16)		3 (6)	2 (4)	13 (25)	6 (12)	(2)	( <del>_</del> )	(—)	( <del>_</del> )	( <del>_</del> )	51
Kalyanpur	21	10 9 (13) (12)	1 1-5	(10)	4 (5)	18 (22)	8 (10)	1 (1)	( <del>_</del> )	(1)	( <u> </u>	( <del>_</del> )	80
	Rainfa	Il Zone-I	<i>I</i>		A.		Rainfall Pattern—E <sub>4</sub> (C <sub>1</sub> L						3) E <sub>4</sub>
Amreli		13				10	_						2.7
Liliya		4 5 (10) (12)	the second second second	(8)	(8)	10 (28)	(17)	(-)	(—)	( <u>—)</u> 0·4	<del>(-)</del>	()	3 <i>7</i> 56
Lathi	11 (20)	$\frac{7}{(12)}$ $\frac{7}{(12)}$		(7)	(7)	12 (23)	10 (17)	0.4	(—)	(1)	<del>(–)</del>	(—)	
Khambha	6 (20)	5 5 (17) (17)		(13)	(8)	(8)	(16)	0·2 (1)	( <del></del> )	( <del></del> )	<del>(-)</del>	()	29
Dhari	16 (23)	10 11 (14) (16)	( <del>-</del> )	7 (10)	5 (7)	(iö)	12 (18)	1 (1)	()	(1)	<del>()</del>	( <u></u> )	70
Amreli	15	8 9 (10) (11)	_	7 (9)	5 (7)	18 (23)	15 (19)	1 (1)	<del>-</del>	( <del>-</del> )	<u> </u>	( <del>-</del> )	78
Balra	12	9 10 (13) (14)	( <del></del> )	(6)	3 (4)	18 (26)	12 (18)	(1)	(_)	( <del>_</del> )	~-· ( <del>~-</del> )	()	69
Bhaynagar Savarkundli Gariadhar		18 21 (11) (13)		16 (10)	12 (7)	36 (22)	27 (17)	1 (1)	( <del>-</del> )	1	( <del></del> )	( <del>-</del> )	161
	(18) (11) (13) (—) (10) (7)  Rainfall Zone—III						(21)						
Mehsana	Ranga	ar zone	••	•		• •		•				2- 1-	-
Chanasma	21	9 6		20	17	4	17	1	3 (3)		1 (1)	 ()	98
Harij	(22) 8 (22)	(9) (6) 6 3 (16) (9)	-	(20) 5 (14)	(17) 3 (9)	(4) 2 (5)	(17) 8 (22)	(1) 0·4 (1)	1 (2)	( <del>-</del> )	(1) (—)	( <del>_</del> )	37
Sami	20	16 12 (19) (14)		(14) 9 (10)	(8)	5 (6)	15 (18)	1 (1)	1 (1)	( <del></del> )	0 · 1	( <del></del> )	86
Jamnagar Jodia	11	5 5	(=	4	4 (7)	21	10	0.3	1	<u>(-)</u>	( <del></del> )	( <del>-</del> )	62
	(18)	(8) (8)	()	(7)	(7)	(34)	(16)	(1)	(1)	<del>\_</del> /	·	()	

neg.=negligible
Note.—Figures in brackets represent percentages to total livestock

5-737Agri/76

### APPENDIX 2 (Contd.)

District the lark	Cattle	Buffaloes	Sheep	Go- Hor- Ma	- Don- Ca- keys mels	Pigs Total live-
District/taluk	Male Fe- You male s	ng Male Fe- You ock male st		& ponies		stock
	Rainfall Zon	III (Contd.)		Ra	infall Pattern—E	$(C_2D_1E_1)E_4$
Banaskantha						204
Vav	23 24 (11) (12)	17 — 14 (8) (—) (7)	8 77 (4) (38)	37 1 (18) (~)	$\begin{array}{cccc} 1 & - & 2 \\ (1) & (-) & (1) \end{array}$	204 (—)
Jharad	23 20 (14) (12)	18 0·4 12 (11) (0·3) (7)	10 44 (6) (27)	35 1 (	)·4 — 2 (·3) (—) (1)	— 166 (—)
Deodar	20 17 (17) (14)	$\begin{array}{cccc} 16 & - & 12 \\ (14) & (-) & (10) \end{array}$	9 15 (7) (13)	26 1 (22) (1)	(-) $(1)$ $(1)$	— 118 ) (—)
Santhalpur	10 12	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	4 18 (5) (24)	15 1		75
Dhanera	(14) (16) 23 21 (12) (11)	19 0·2 14 (10) (0·1) (7)	11 50 (6) (27)	47 0.3	— 1 (—) (0·3) (2	3 189
Radhanpur	11 9	7 6	4 8	11 1	- 0.4 -	57
Kankrej	(19) (16) 21 16	(12) $()$ $(11)$ $14$ $$ $10$	(7) (4) 8 12	(19) (1) 18 1	(-) (1) (- - 1 1	102
	(20) (16)	(13) (—) (9)	(8) (12)	(18) (1)	(—) (Ī) (Ī	) ()
	Rainfall Zo	neIV	••	., R	ainfall Pattern	$-E_4(C_2D_2)E_4$
Surendranagar		A 1000000			2.2	47
Sayla	10 7 (22) (15)	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\bigcirc$ (6) (15)	8 1 (17) (2)	— 0·3 — (—) (1) (—	-) ()
Dasada	16 13 (21) (17)	8 - 6	5 8 (7) (11)	17 1	1 ( <u>-</u> ) (1) (-	75 -) ()
Limbdi	20 11 (28) (15	9 - 8	7 2	13 1	- 1 0 ·· (-) (1) (	4 — 72 (1) (—)
Wadhwan		6 5 —	4 4 5	5 14 0.4	— 1 (—) (2) (-	48 -) (-)
Muli	10 (19) (15)	6	4 12	8 1	( <del>-)</del> 0·4 ( <del>-</del> )	-) ( <del>-</del> ) 53
Bhaynagar		हिंदेरी केंग्रा				
Umrala	6 (14) (12		3 3 12 (7) (28)	2 8 0.2 (19) (1)	(-) (-) (-	43 -) ()
Gadhada	13 10 (18) (13	) 10 네스스테미 극4	4 19	14 1	- 0·4 - (-) (1) (-	74
Sehor		9 — 7	5 19	12 0.3	— 0·3 — (—) (0·4) (—	<b>— —</b> 72
Vallabhipur	, , ,	5 6	1 3 6	5 0.2	— 0·2 (—) (1) (—	<del>-</del> - 37
	Rainfall Z	one—V		R	ainfall Patterns-	$-E_4(B_1C_1E_2)E_4$
Jamnagar	210117011 2		•		-	7
Bhanwad	13 (23) (1)			9 11 1	— 1 (—) (1) (-	57 ) ()
Jamjodhpur		1 10 —	9 5 1	1 12 1	- 0.4	
Klavad		3 12	6 4 3	3 16 1	_ 1	
Khambhaliya	19 (24) (1	9 10 —	8 6 1	8 9 1	_ 2	
Lalpur	13 (19) (1)	7 8 —	6 5 2	1 9 0.4	- 1	$\stackrel{\cancel{-}}{\rightarrow} \stackrel{\cancel{-}}{(-)} \stackrel{70}{\rightarrow}$
Jamnagar	18	14 13	8 5 4	1 23 1	- 2 (-) (1) (	
Dhrol	(15) (1 7 (18) (1	5 4	6) (4) (3) 2 1 1 5) (2) (3)	3 7 0.3	- 1	(-) () 4( (-) (-)
Junagarh	(20)	-, (^-, ( ) (	-, ( <del>-</del> )			. , , ,
Una	29 (27) (1	21 23 — 9) (21) (—) (1	14 7 3) (6) (	5 8 2 (5) (7) (2)	(-) ()	109 () ()
Bhesan	. 8	4 4 —	3 2	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	<b></b> 0⋅3	

APPENDIX 2 (Contd.)

		Cattle		В	uffalo		Shee	_	Hor-	Mu-	Don-		Pigs	Tota
District/taluk		Fe- Y			Fe- nale	Young stock	_	ats	ses & ponies	les	keys	mels		live- stock
	Rainfall	Zone -	-V (Co	ntd.)						Rainfa	ll Patte	rn—E	$(B_1C_1)$	$E_2$ ) $E_4$
Junagadh (Contd.) Visavadai	15 (23)	10 (16)	9 (15)	0·2 (0·3)	8 (13)	5 (9)	7 (11)	7 (11)	0·1 (1)	_ ( <u>~</u> )	0·3 (1)	 ()	()	62
Patan Veraval	26	16		( <del>_</del> )	7	4	5	6	1	( <del>-</del> )	1		`	84
Ranavav	(31) 7 (18)	(19) 4 (11)	(21) 5 (14)	( <del>-</del> )	(8) 5 (14)	4	(6) 5 (14)	6	(1) 0·3 (1)	( <del>-</del> )	(1) 0·2 (1)	( <del>-</del> )	(—) (—)	37
Kutiyana	(20)	6 (13)	5 (12)	()	8 (18)	5	(11)	6 (13)	(2)	( <del></del> )	( <del>-</del> )	( <del>_</del> )	( <del>_</del> )	45
Por bandar	23	12	14		13	7	25	8	1		0 .4			104
Amreli	(22)	(12)	(13)	()	(12)	(7)	(24)	(8)	(1)	()	(1)	()	()	
Kodinar	17 (30)	12 (21)	13 (23)	(—)	4 (7)		3 (5)	5 (8)	1 (1)	()	( <del>_</del> )	<del>-</del>	( <del></del> )	59
Rajula	(20)	10 (14)	9 (13)	( <del></del> )	8 (12		(20)	(11)	(2)	( <del>-</del> )	0·3 (1)	<u> </u>	( <del>-</del> )	66
Jafrabad	7 (25)	(17)	6 (21)	()	(7)	1	5 (17)	2	0.4 (2)	( <u> </u>	( <del>_</del> )	( <del>_</del> )	( <u>~</u> )	29
Kunkarvavadia	17	7	9		7	5	13	12	1		1	-		72
Rajkot	(23)	(10)	(13)	()	(9)	(8)	(18)	(17)	(1)	()	(1)	()	()	
Dhoraji	8 (21)	6 (16)	6. (16)	(-)	(11)	3 (8)	4 (11)	6 (16)	( <u> </u>	( -	0.2	<u>_</u>		37
Jetpur	13 (22)	(13)	(13)		(11) 5 (8)	3	(11) 14 (24)	(13)	0·3 (1)	( <del>-</del> )	(1) 0·3 (1)	( <del>-</del> )	( <u>-</u> )	59
<b>J</b> amkondarna	9	6	6 (14)	12 18	3	2	11	6			_		_	
Gondal	(21) 21 (20)	(14) 15 (14)	14 (13)	$\bigcirc$	(7) 7 (7)	(4) 5 (5)	(26) 27 (25)	(14) 16 (15)	( <del>-)</del>	( <del>-</del> )	(-) 1 (1)	( <del>-</del> )	( <del>_</del> )	44 105
Lodhika	(18)	(9)	(12)	( <del>-</del> )	(6)	1	12	5	_	_	0.2		_	33
Paddhari	(18) (18)	(12)	(12)	-	(6) 3 (5)	2	(36) 15 (30)	(15) 8 (16)	() 0·3 (1)	( <u>-</u> )	(1) 1 (2)	( <u>-</u> )	( <del>-)</del>	49
Kotda Sangani	7 (15)	(11)	(11)	( <u> </u>	(4)	(4)	18 (38)	7 (15)	0.3	(_)	0.3		_	47
Upleta	11 (18)	10 (18)	(15)		(11)		8 (14)	(15)	0·4 (1)	·( <del>-</del> )	(1) 0·3 (1)	( <del>-</del> )	( <del>-</del> )	59
Rajkot	19 (15)	17 (13)	15 (12)	( <del>-</del> )	8 (6)	(4)	38	21	1	(_)	5	-	` <u> </u>	130
Jasdav	22 (18)	17 (14)	19 (16)	( <del>_</del> )	(6) (6)	(4) 5 (4)	(29) 27 (22)	(16) 22 (18)	(1) 1 (1)	(-)	(4) 1 (1)	( <del>-</del> )	( <del>-)</del>	122
Morvi	21 (16)	12 (9)	12 (9)	( <del>_</del> )	10 (7)	(6)	46 (34)	22 (17)	(1)	( <del>-</del> )	1 (1)	( <del>-</del> )	( <del>-</del> )	132
Wankaner	16 (14)	10 (9)	(10)	( <u> </u>	(8)	7 (6)	35 (31)	24 (21)	( <del>-</del> )	( <del>-</del> )	1 (1)	<u>(_)</u>	$\overline{}$	114
Maliya	8 (18)	3 (7)	3 (7)	( <del>-</del> )	4 (9)	4 (9)	13 (30)	8 (18)	0.3	()	0 •4		_	44
Surendranagar	(10)	(7)	(7)	()	(2)	(3)	(30)	(10)	(1)	()	(1)	()	()	
Ghotila	15 (19)	3 (16)	11 (14)	<u>(-</u> )	9 (11)	5 (6)	13 (16)	13 (16)	(1)	_	0.3		_	80
Lakhtar	8 (23)	(13)	(14)	( <del>-</del> )	3 9)	(0) 2 (7)	(16) (16)	5 (16)	1 (2)	( <del></del> )	0 · 3	( <del></del> )	( <del>-</del> )	33
Halvad	13 (19)	8 (12)	7 (10)	(	(6)	(4)	22 (33)	10	0 •4	( <del>-</del> )	(			67
Dhrangadhra	12	9	7		5	4	18	(15) 19	()		0.4	( <del></del> )	( <del></del> )	75
Mehsana	(16)	(12)	(9)	(—)	(7)	(5)	(24)	(25)	(1)	(—)	(1)	()	()	
Patan	24	16	12	<u>—</u>	24 (18)	17	9	26	1 (1)	 ()	3 (2)	1 (1)	<u>,-</u> ,	135
Ridhpur	(18) 18 (20)	(12) 7 (8)	(9) 4 (4)	( <del>-)</del>	27 (30)	(13) 13 (15)	(7) 5 (5)	(19) 12 (14)	(1)	( <del></del> )	(2) 2 (3)	(1) 1 (1)	( <del></del> )	89
Kheralu	25	7 (7)	6 (6)	( <del>-</del> )	27	17	4	14	( <del>_</del> )	( <del>-</del> )	2	1		102
Mehsana	(24) 18 (18)	(7) 8 (8)	(6) 5 (5)	( <u>)</u>	(27) 27 (28)	(17) 20 (20)	(4) 6 (6)	(13) 12 (12)		( <del>-</del> )	(1) 2 (2)	1	() ()	98

#### APPENDIX 2 (Contd.)

	Cattle Buffaloes Sheep Go. Hor- Mu- Don- Ca- Pigs To	
District/taluk	Male Female Young Male Fe- Young & stock male stock ponies	ve- ock
	Rainfall Zone—V (Contd.) Rainfall Pattern— $E_4(B_1C_1E_2)$	$E_4$
Banaskantha Vadgam	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	82
Ahmedabad Viramgaon	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	114 )E <sub>4</sub>
<b>dhavnagar</b>		
Botad	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	52
Palitana	12 10 10 7 5 23 14 1	82
Bhavnagar	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	60
Ghogha	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	43
Talaja	18 6 7 0.2 16 9 33 9 1 — (1) — —	100
Mohua	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	128
Mehsana		
Vijapur	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	125
Viinagar	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	65
Kalol	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	65
Kadi	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	83
Ahmedabad		
Dehgam	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	80
Dhandhuka	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	101
Dolka	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	93
Sanane	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	56
Vadodara		
Jambnagar	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	88
Gandhinagar		o. <b>7</b>
Gandhinagar	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	<b>82</b> .
Kheda		
Gombay	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	72
The stand	Rainfall Zone—VII Rainfall Pattern— $E_4(B_2E_3)$	3)E4
Banaskantha Deesa	31 29 23 1 17 11 23 39 1 2 4 (17) (16) (13) (1) (9) (6) (13) (21) (1) (-) (1) (2) (-)	181
Palampur	30 20 15 — 24 15 11 48 — — 3 2 — (18) (12) (9) (—) (14) (9) (7) (28) (—) (—) (2) (1) (—)	168
Danta	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	101
Sabarkantha		
Khedbrahma	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	121

#### APPENDIX 2 (Contd.)

		C	ttle	В	uffaloe	s	Sheep	Go-			Don-		Pigs	Total
District/taluk	Ma	le Fen			ile Fe-	Youn le stoc	g	ats	ses & ponie	les s	keys	mels		live- stock
	Rain	fall Zo	ne—VI	<i>II</i>						Rainf	all Pat	tern—L	$E_4(B_2)$	$C_2)E_4$
Panchmahais Shehera	28 (31)	14 (16)	10 (11)	0·2 (0·3)	11 (12)	8 (9) <sup>-</sup>	 ( <del></del> )	19 (21)	~-· ()	 (—)	0·1 (0·1)	0 · 1 (0 · 1)	_ ( <u></u> )	90
Limkheda	50 (30)	21 (13)	17 (10)	(—)	14 (8)	10 (6)	()	55 (33)	()	()	(—)	()	( <del>_</del> )	167
Dohad	56 (31)	34 (19)	25 (14)	( <del>~</del> )	12 (7)	8 (4)	5 (3)	40 (22)	<u>()</u>	 ()	1 ()	()	( <del></del> )	181
Zalod	44 (26)	27 ( 6)	37 (21)	()	14 (8)	9 (5)	2 (1)	39 (23)	( <u></u> )	(-)	(-)	()	( <del>-</del> )	172
Lunavada	42. (29)	15 (11)	10 (7)	(~)	27 (19)	22 (15)	<u>()</u>	26 (18)	<u>()</u>	( <del>-</del> )	1 (1)	( <del>-</del> )	( <del>-</del> )	144
Vadodara Savli	19 (30)	4 (6)	6 (10) ne—IX	( <del></del> )	13 (20)	12 (19)	1 (1)	9 (13)	( <u> </u>	<u>-</u>	1 (1)	()	()	65 ) E <sub>4</sub>
Junagadh	Itting	20	,,,,	••		••		•			2 43727	. ~4 (		, 1-4
Manavadar	12 (24)	6 (12)	(12)	( <u>→</u> )	(17)	(11)	(12)	(10)	0·4 (1)	(_)	0 · 4 (1)	(—)	(· <del>-</del> )	94
Keshod	15 (28)	7 (13)	(13)	( <del>-</del> )	9 (17)	6 (11)	(7)	5 (19)	0·3 (1)	( <del>-</del> )	0·3 (1)	( <del>-</del> )	( <del></del> )	54
Malia	15 (28)	9 (18)	(18)		(15)	(8)	(4)	(8)	0·4 (1)	( <del>_</del> )	(_)	(—)	( <del>-</del> )	52
Talla	11 (24)	7 (16)	(19)	(—)	(19)	(13)	0·3 (1)	(7)	0·2 (1)	<del>(-)</del>	0·3 (1)	( <u> </u>	(-)	46
Mendarda	7 (25)	5 (16)	5 (16)	(-)	(14)	(11)	(6)	(11)	0·2 (1)	<u>(—)</u>	0·1 (1)	( <del>_</del> )	( <del>_</del> )	28
Vanthali	(20)	5 (11)	5 (11)	$(\overline{-})$	8 (18)	(9)	7 (16)	6 (14)	0·4 (1)	( <del></del> )	()	(—)	(—)	44
Junagadh	11 (20)	(15)	(15)	(-)	(17)	4 (8)	4 (8)	8 (15)	(1)	( <del>-</del> )	(1)	( <u>—</u> )	( <u>—</u> )	54
Mangrol	16 (28)	8 (14)	(15)	<u>(-)</u>	(12)	4 (7)	8 (13)	5 (9)	0·4 (1)	( <del>_</del> )	0·4 (1)	( <del></del> )	( <del>_</del> )	56
Surat	10	4	165		17	6	3	19	1	_	1	_		66
Ghorari Olpad	(15) 11	(6) 3	(8)	7. ( <u> </u>	(26)	(9) 6	(5) 4	(29) 10	(1)	( <del>_</del> )	(1)	( <del>_</del> )	( <del>_</del> )	47
	(23)	(6)	(9)	(—)	(19)	(13)	(9)	(21)	(—)	(—)	(—)	(—)	<del>(-</del> )	
Bharuch Amod	7 (32)	1 (4)	(4)	( <del>_</del> )	4 (17)	3 (13)	1 (4)	5 (23)	0 ·4 (2)	( <del></del> )	0 -2	<u> </u>	-) ( <u> </u>	-) 23
Jambusar	14 (30)	2 (4)	3 (7)	0·2 (1)	9 (18)	(15)	(1)	11 (22)	0 ·4	· (—	· 0·4 ·) (1		(-	- 49 )
Vgara	10 (39)	(4)	(4)	( <del>_</del> )	4 (18)	4 (15)	(4)	4 (14)	0·4 (2)	( <u>—</u> )	0·1 (0·3)	( <del>-</del> )	(—)	25
Bharuch	12 (24)	(2)	(2)	(—)	9 (18)	5 (11)	2 (4)	17 (35)	1 (2)	( <u>~</u> )	1 (2)	()	( <del></del> )	49
Hansat	7 (31)	3 (12)	3 (12)	( <del></del> )	4 (13)	(8)	1 (4)	4 (17)	0·2 (1)	_ (—)	( <del></del> )	( <del>_</del> )	 ( <u>—</u> )	24
Ankleshwar	10 (29)	(10)	4 (11)	(-)	(13)	(10)	(6)	6 (19)	0·3 (1)	()		~~· (—)	<del>()</del>	33
¥7b a da	Rain	fall Zo	ne—X	••		• •		•	. Ra	infall	<b>Pa</b> ttern	$E_4$	$A_1B_1C_1$	$E_1)E_4$
Kheda Mehmedabad	18 (26)	3 (4)	5 (7)	<u>—</u>	21 (31)	14 (21)	1 (1)	6 (9)	( <del></del> )	( <del></del> )	0·4 (1)	(—)	<u> </u>	68
Nadki (Kheda)	23 (22)	(3)	5 (5)	_	33 (31)	24 (22)	(5)	12 (11)	( <del>-</del> )	( <u> </u>	1	( <u> </u>	( <u> </u>	106
Kapadvanj	31 (26)	5 (4)	7 (5)	(—)	31 (26)	27 (23)	(3)	14 (12)	( <del>-</del> )	()	1		`	120
Sabarkantha Vijay Nagar	12 (20)	8 (14)	8 (13)	( <u></u> )	5 (8)	4 (7)	0·3 (1)	22 (37)	( <del></del> )	( <u> </u>	_	_		59
Bhileda	28 (24)	(14) 13 (11)	12 (11)	()	(12) (11)	(8)	(1)	38 (33)	()	( <u>-</u> )	1	( <u>~)</u> ( <u>~)</u>	( <u>—)</u>	114

APPENDIX 2 (Contd.)

		tile	APP	ENDIX	uffalo		Sheep	Go-	Hor-	Mu-	Don-	<u> </u>	Dies	Total
District/taluk		Fe-	Young stock		Fe-	Young stock		ats	ses & Ponies	les	keys	mels	_	live- stock
	D al			(Conto		Stock					ttern—l	F A (	 В. С.	E) E.
Sabarkantha (contd.)	Kan	nyau Ze	те—л	(Com	1.)	••		• •	Nang	an ra	iterii—I	~4 A1(	J <sub>1</sub> C <sub>2</sub>	<i>L</i> 1) <i>L</i> 4
Meghraj	22	12	11	, <del></del>	9	7	1	34		(~~	( )	(-	<u></u>	95
Prautij	(23) 24 (25)	(13) 9 (10)	(11) 7 (7)	(—) (—)	(9) 23 (24)	(7) 16 (16)	(1) 2 (2)	(36) 13 (14)	(—) (—)	( <del>-</del> )	() 1 (1)	() 1 (1)	( <u>-</u> )	95
Himatnagar	19 (22)	(10) 7 (9)	(8)	( <del>-</del> )	16 (19)	13 (15)	4 (5)	17 (20)	()	( <del>-</del> )	1 (1)	0·4 (1)	( <del>-</del> )	85
Modasa	24 (23)	13 (13)	(10)	( <u>—</u> )	16 (15)	13 (12)	(2)	23 (22)	( <del></del> )	()	(2)	(1)	( <del></del> )	103
Malpur	13 (24)	(13) 6 (12)	(10) 5 (10)	( <del>-</del> )	(1 <i>5</i> ) 8 (16)	6 (12)	0.3	13 (24)	( <del>-</del> )	( <del>_</del> )	0·3 (1)	( <u>-</u> )	( <del></del> )	52
Bayad	20 (24)	(12) 6 (8)	(10) 6 (7)	()	17 (20)	16 (19)	(1) 5 (6)	12 (15)	( <del>_</del> )	( <u>—</u> )	1 (1)	( <del>_</del> )	(—)	83
Idar	31 (24)	(6) (6)	(7) (7)	( <del>-</del> )	28 (22)	22 (17)	(2)	25 (19)	( <u>-</u> )	( <del>_</del> )	(2)	(1)	( <del>-</del> )	129
Ahmedabad		-		( )					( )	• /		(-)	` ,	
Ahmedabad	3 (7)	7 (17)	(10)	( <del></del> )	10 (24)	6 (14)	(2)	10 (24)	<del>(-)</del>	( <del>-</del> )	(2)	<del>(</del> )	(—)	43
Daskray	19 (23)	7 (9)	6 (7)	()	23 (28)	17 (20)	(1)	9 (11)	( <del>-</del> )	( <del></del> )	(1)	<del>(-)</del>	(-)	82
	Rain	fall Zoi	ne-XI		1				• •	Rainfa	ll Patter	n-E <sub>4</sub>	$(A_1 B_1)$	$(C_2)E_4$
Kheda Matar	15	6	7		14	11	3 (5)	7 (10)	<u>—</u>	<del></del>	1	<u> </u>	<u>_</u> _	63
Borsad	(24) 17 (19)	(9) 2 (2)	(10) 4 (4)	(-)	(23) 36 (38)	(18) 23 (25)	(2)	(9)	( <del>-</del> )	( <del>-</del> )	(1) 1 (1)	( <del>-</del> )	( <u>-</u> )	92
Petlad	13 (18)	(3)	3 (5)		27 (36)	18 (25)	(3)	7 (9)	( <del>_</del> )		0·4 (1)	( <del>_</del> )	(-)	74
Thasra	20 (25)	(5)	(7)	( <u>-</u> )	17 (21)	16 (26)	(10)	9 (11)	( <del></del> )	( <del>_</del> )	(1)	( <u>-</u> )	`_	81
Balasinor	22 (29)	(8)	(6)	- jij -	14 (19)	12 (15)	4 (5)	13 (17)	( <u> </u>	( <u> </u>	(1)	( <del>-</del> )	( <u> </u>	7 <b>7</b>
Anand	19 (21)	(2)	(3)	( <del></del> )	33 (36)	(24)	(3)	9 (10)	( <del>-</del> )	( <del>_</del> )	(1)	( <del></del> )	( <del>-</del> )	92
Panchmahals			4.1	LS LEA	-19.1				` ´	•		` '		265
Santrampur	74 (28)	32 (12)	25 (9)	(—)	(12)	23 (9)	<del>(-)</del>	76 (29)	(—)	()	(1)	<del>(-)</del>	(—)	265
Godhra	49 (30)	23 (14)	19 (12)	<del>(-)</del>	18 (11)	14 (9)	()	39 (24)	( <del>-</del> )	(_)	(0 ·4)	<u>(-</u> )	<u>(—)</u>	164
Devgadh Baria	56 (32)	17 (10)	13 (8)	<del>(-)</del>	17 (10)	13 (8)	<u>(—)</u>	55 (32)	( <del></del> )	( <del>-</del> )	( <u>—</u> )	( <del>-</del> )	( <del>-</del> )	173
Kalol	17 (32)	6 (11)	(10)	(—)	10 (18)	7 (14)	(–)	7 (13)	0·3 (1)	()	0·4 (1)	<del>(-)</del>	()	52
Halol	18 (30)	8 (14)	(12)	( <del>-</del> )	8 (14)	5 (9)	(—)	12 (21)	(-)	<u>()</u>	()	(-)	<del>(-)</del>	58
Bharuch Sagbara.	12	4	4	0 •2	1	2		6		_		_		29
Jhagadia	(41) 16	(14)	(14)	(1)	(3) 6	2 (6) 5	( <del></del> )	(21)	( <del></del> )	( <del></del> )	( <del></del> )	( <del></del> )	( <del></del> )	60
Jnagauia Valia	(26) 13	(15) 7	(18)	( <del>-</del> )	(10)	(8)	(1) 8	(21)	(1) 0·2	()	( <del>-</del> )	( <del></del> )	(—) —	49
Nanded	(27) 21	(15) 10	(15)	( <del></del> )	(7)	(6) 6	(16)	(13) 25	(1)	( <del>-</del> )	( <del></del> )	() 	( <del>-</del> )	84
Dediapada	(25) 16	(12)	(15)	( <del>-</del> )	(10)	(7)	(1)	(30) 8	(—) —	(—) —	(—) —	( <del></del> )	( <del></del> )	
	(38)	(18)	(19)	<b>(-</b> -)	(3)	(3)	()	(19)	()	()	()	()	()	,_
Surat Mangrol	21 (33)	10 (16)	10 (16)	<u>(—)</u>	5 (8)	4 (5)	1 (1)	13 (20)	0·4 (1)	<u>(–)</u>	<del>()</del>	<u>—</u>	()	65
Vadodara Sinor	(35)	(13)	(10) 1 (3)	()	4 (23)	(13)	0.2	(18)	0·2 (1)	( <del>_</del> )	0·3 (2)	( <del>_</del> )	( <del>_</del> )	18
Dabhai	(36) 14 (33)	(5) (5)	(3)	( <u>-</u> )	(23) 8 (19)	(13) 5 (13)	0.4 (1)	(20)	0.2 (1)	( <u> </u>	0.3	( <u> </u>	( <u>-</u> )	42

APPENDIX 2 (Concld.)

	APPENDIX 2 (Concld.)
	Cattle Buffaloes Sheep Go- Hor Mu- Don- Ca- Pigs Total ats ses les keys ands live-
District/taluk	Male Female Young Male Fe- Young & stock stock ponies
	Rainfall Zone—XI. (Contd.)
Karjan	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Vaghodia	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Vadodara	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Padra	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
	Rainfall Zone—XII Rainfall Pattern— $E_4$ ( $A_2$ $B_1$ $C_1$ ) $E_4$
Vadodara Sankheda	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Tilakwada	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Naswadi	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Chhotaudaipur	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Panchmahals	1 2 2 1 1 - 5 15
Jambughoder	(27) $(13)$
Surat	
Sangade	(35) $(21)$ $(18)$ $(2)$ $(2)$ $(1)$ $(-)$ $(21)$ $(-)$ $(-)$ $(-)$ $(-)$
Vyara	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Palsana	(23)  (9)  (12)  (-)  (19)  (9)  (4)  (24)  (-)  (-)  (-)  (-)  (-)  (4)
Mahuva	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Valod	(28)  (15)  (18)  (-)  (10)  (8)  (4)  (17)  (-)  (-)  (-)  (-)  (-)
Mandvi	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Nijhar	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Uchhal	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Kamrej	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Bardoli	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Bulsar	Kangat Zone—Atti
Gandevi	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Chikhli	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Bansda	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Navsari	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
•	Rainfall Zone—XIV Rainfall Pattern—E <sub>4</sub> (A <sub>3</sub> B <sub>1</sub> ) E <sub>4</sub>
Valsad	
Umbergaon	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Pardi	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Valsad	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Dharampur	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
The Dangs Ahwa	20 18 18 3 1 1 - 14 76
	(26) (24) (24) (4) (2) (1) () (19) () () () ()

APPENDIX 3 Rainfall and Cropping Patterns **GUJARAT** 

Cropping patterns District/taluk		Gcog- raphical	Elevati	оп	Annu	al rainf	all		*C	onsecut	ive mo	nths
		area	(masl)	,	(total	rd	mmr	mr	nd	a	b	С
		(sq km)		nin	Citi)							•—
	Rainfall Zone I						. R	ainfall	Patte	rn—E4(	$C_1D_1E$	$_{2})E_{4}$
	Kutch											
JK <sub>3</sub> C <sub>4</sub> F <sub>4</sub>	Mundra Anjar	888 1312	100 100	sl sl	36 34	15 17	7 7	28 23	11 11		_	_
$\mathbf{B_3F_4Jk_4Pu_4/W_4}$	Abdasa Rapar Bhachau	2400 2998 2000	188 100 50	sl sl <b>s</b> l	29 35 34	13 17 15	7 7 7	21 24 24	9 11 11	_	=	_
B <sub>3</sub> Gn <sub>3</sub> Pu <sub>4</sub> F <sub>4</sub> Jk <sub>4</sub> B <sub>4</sub>	Lakhpat Bhuj	1942 4528	88 298	sl sl	25 34	10 15	7 7	20 23	7 10		<del></del>	_
Gn <sub>4</sub> Pu <sub>4</sub> B <sub>4</sub> F <sub>4</sub> /Jk <sub>4</sub> B2 Jk4	Mandvi Nakhatrana	1425 1984	144 388	sl sl	41 27	17 13	7 7	30 19	9	_	_	_
$Gn_3B_4Jk_4/C_4$	<b>Jamnagar</b> Okhamandal Kalyanpur	717 1412	10 92	sl sl	36 44	16 na	7 7	29 31	15 na	6-2 7-2	29 31	15 na
	Rainfall Zone—II	LONG GI		-	• •			Rainf	all Pa	ttern—E	$E_4(C_1D_1)$	<sub>3</sub> )E <sub>4</sub>
	Amreli	61.34	76年	\$			-	20		7.3	40	
$Gn_3B_4Jk_4/C_4$	Liliya Lathi	395 633	105 150	100 100	54	na na	7 7	38 37	na na	7-3 7-2	49 37	na na
$Gn_2B_4/Jk_4$	Khambha Dhari Amreli Babra	407 1094 830 793	529 248 140 239	150 150 100 150	53 52	na na na na	7 7 7 7	29 35 28 33	15 na 13 na	6-2 7-2 6-2 6-4	29 35 28 53	13 na 13 na
	Bhavnagar											
$Gn_3B_3$	Savarkundla \	1644	216	100	38	na	7	23	na			_
	Gariadhar J	1100	100	61	na	na	na	na	na	na	na	n
	Rainfall Zone—III	बदापंब	नगर्न				R	ainfall	Patt	ern—E40	$(C_2D_1E$	$E_1)E_4$
$B_4Jk_4W_4O_4/C_4/Gn_4$	<b>Mehsana</b> Chanasma Harij	888 407		50 50		na na	7 7	33 31	na na	7-3 7-2	46 31	n n
$C_4Jk_4(B_4)$	Sami Jamnagar	1510	100	10	42	na	7	27	na	7-2	27	n
Gn <sub>3</sub> Jk <sub>4</sub> B <sub>4</sub>	Jodiya Banaskantha	869	28	s	1 44	па	7	30	na	7-2	30	n
B <sub>2</sub> F <sub>4</sub>	Vav Tharad Deodar Santalpur	170: 1358 1012 1352	3 140 2 68	10 43 43 10	2 51 2 41	na 20 na na	7 7 7 7	21 37 24 27	па 14 па па	7-2 7-3	37 36 27	- 1 r n
$B_3Jk_4F_4/C_4(W_5)$	Dhanera Radhanpur Kankrej	1190 590 82	) 199 5 42	150 3	0 39 4 51	na 23	7 7 7	21 38 30	na 16 na	7-3 7-2	31 38 46	n 1 n

masi = metres above sea level

=rainy days rd

mmr = month of maximum rainfall
mr = total rainfall of mmr plus that of preceding or following
month whichever is higher, in cm.

=number of rainy days of mmr plus that of preceding or пd following month, whichever has higher rainfall.

=sea level sl

\*Consecutive months with rainfall of more than 10 cm per month

a=Initial month with more than 10 cm of rainfall and number of consecutive months with more 10 cm/month, separated by hyphen

c-Total number of rainy days of consecutive months under 'a' in cm under 'a'

na=not available

Notes: 1. Information on rainfall and rainy days is based on the Memoirs of India Meteorological Department, Vol. XXXI, Part III as on 12th May, 1961.

<sup>2.</sup> For explanation of coded form of rainfall and cropping patterns, reference may be made to section 2 in the text.

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#### APPENDIX 3 (Contd.)

Cropping patterns	District/taluk	Geog- raphical	Elav (mas	ation	Annı	ıal raiı	ıfall			*Cons	cutive	month
		area (sq km)		min	total (cm)	rd	mmr	mr	nd	a	ь	С
	Rainfall ZoneI	ν						Rain	fall P	attern-	$-E_4(C_2)$	$D_2)E_4$
D.C. C.Y. /F	Surendranagar	0.25		150	46		0	20				
$B_3Gn_4C_4Jk_4/F_4$	Sayla Dasada	937 1643			46 30	na	8 8	30				
$C_2 Jk_4/B_4$	Limbdi	1713	100		64	na na	9	23 34	na na		23 52	
C <sub>3</sub> Jk <sub>4</sub> B4	Wadhwa	<b>7</b> 97				24		31				
•	Muli	936	150	100	na	na	na	na	na	na	na	
	Bhavnagar		4.0.0				_					
B3Gn4Jk <sub>4</sub>	Umrala Gadhada	407 897	100 150	50 100	51 55	na na	9 8	27 33	na na		51 53	
	Schor	721	100	50	56	na	7	35	na		45	
$Jk_3B_4Gn_4/W_4$	Vallabhipur	594	100	50	58	na	9	35	na		35	na
	Rainfall Zone—V							Rain	fall Par	tern-	$E_4B_1C_1$	$E_1)E_4$
	Jamnagar										T . 1	17 4
Gn <sub>1</sub>	Bhanvad	732	637	300	65	na	7	35	na	7-2	35	na
-	Jamjodhpur	1084	362	150	62	na	7	44	na	7-2	44	na
a ri m	Kalavad	1245	169	150	43	na	7	29	na	7-2	29	na
Gn <sub>2</sub> Jk <sub>4</sub> /B <sub>4</sub>	Khambhaliya Lalpur	1214 1075	38 150	sl 38	62 56	na na	. 7	46 34	na na	7-2 7-3	46 44	na na
Gn <sub>3</sub> Jk <sub>4</sub> B <sub>4</sub>	Jamnagar	1226	18	sl	47	21	7	33	14	7-2	33	14
~jv #4 ***4	Dhrol	597	113	28	61	na	7	45	na	7 <b>-</b> 2	45	na
	Junagadh											
B <sub>3</sub> Gn <sub>4</sub> Jk <sub>4</sub>	Una	1568	256	s1	63	na	7	46	na	6-3	57	na
Gn <sub>1</sub>	Bhesan	439	600	150	na	na	na	na	na	na	na	na
$Gn_2W_4/C_4/J_{14}$	Visavadar	902	150	100	na	na	na	na	na	na	na	na
Gn <sub>3</sub> B <sub>4</sub> Jk <sub>4</sub>	Patanveraval	688	56	sl	53	25	7	33	13	6-2	33	13
$Gn_3C_4F_4/Jr_4$	Ranavav	588	100	10	76	na	7	33	na	-		_
o 1 12 m	Kutiyana Porbandar	566 1141	100	10 sl	64 50	na 23	<b>7</b> 7	55 23	na 12	6-3	66	na
$Gn_4Jr_4F_4B_4$		de la constante de la constant	Link,	i.	20		•	23	12		_	
) G = G	Amreli Kodinar	521	- 28	sl	75	na	7	57	na	6-3	70	
33Gn <sub>4</sub> S <sub>4</sub>	Rajula	850	150	s1	57	na	7	36	na	7-2	36	na na
3 <sub>3</sub> Jk <sub>4</sub> Gn <sub>4</sub>	Jafrabad	355	10	s1	58	31	7	34	16	6-3	44	24
Gn <sub>1</sub>	Kunkavarvadia	834	194	150	56	na	7	38	na	7-2	38	na
-	Rajkot											
	<b>D</b> horaji	484	314	82 82	61	32	7	37	19	6-3	47	24
	Jetpur Jamkandarna	679 567	100 146	100	56 59	na na	7 7	44 41	na na	7-2 7-2	44 41	na
	Gondal	1194	176	100	62	32	Ź	38	19	6-3	49	na 23
	Lodhika	373	150	100	43	na	7	32	na	7-2	32	na
Gn <sub>1</sub>	Paddhari Katdasanaani	646 447	113 264	84 150	49 56	na	7 7	35 38	na	7-2 7-2	35 38	na
T- 10 1/7	Kotdasangani Upleta	793	204 298	50	na na	na na	ла	na	na na	na		na
$\operatorname{In}_2\mathrm{B}_4/\mathrm{C}_4$	Rajkot	1058	150	113	59	29	7	37	17	7-2	na 37	na 17
	Jaslan	1327	254	150	62	30	7	38	18	7-2	38	18
${\rm in_3B_4Jk_4/C_4}$	Morvi	1697 1118	100 183	50 100	53 56	24 27	7 7	39 38	16 17	7-2 7-2	39	16
	Wankaner Maliya	770	50	110	50 64	na	8	38 44	17 na	7-2 7-3	38 59	17 na
$_3$ Jk $_4$ /B $_4$		770	50		UT	. 144	Ü	· 7 · T	1101	1-3	59	114
	Surendranagar	1050	246	100	60		O	14	40	7.3	<b>F</b> O	
$_3Gn_4Jk_4/F_4$	Ghotila	1058 734	346 50	100 23	69 49	na	8 7	44 30	na	7-3 7-2	59 30	na
$_{2}Jk_{4}/B_{4}$	Lakhtar Halvad	134 1232	50 62	10	68	na na	7	50 40	na na	7-2 7-3	30 59	na na
	Dhrangadhra	1370	100	ìŏ	51	24	7	34	15	7-2	34	15
	Mahesana											
<sub>4</sub> Jk <sub>4</sub> W <sub>4</sub> O <sub>4</sub> /C <sub>4</sub> /Gn <sub>4</sub>	Patan	1047	150	100	62	28	7	46	20	7-2	46	20
45 4 + + 4 4   4	Sidhpur	671	150	100	52 54	na	7	34 38	na	6-3	44	na
	Kheralu Mahsana	9 <i>5</i> 3 791	370 100	150 50	61	na 32	8 7	38 44	na 23	7-2 7-2	38 44	na 23
				=		-		•			• •	
	Banaskantha	565	290	150	59	na	7	38	no	7-3	51	***
$_4$ J $k_4$ W $_4$ /F $_4$	Vadgam <b>Ahmadabad</b>	202	470	150	27	11d	′	50	na	1*3	31	na
	Viramgam	1714	37	27	59	29	7	41	19	7-2	41	19

#### APPENDIX 3 (Contd.)

Cropping patterns	District/taluk	Geog- raphical	Elevat (ma		Annua	rainf	all		*(	onsecu	itive mo	onths
		arca (sq km)			total (cm)	rd	mmr	mr	nd '	a	ь	c `
	Rainfall Zone—VI Bhaypagar							Rainfall	Patte	rn—E <sub>4</sub> (	$B_1C_2E$	1)E <sub>4</sub>
B <sub>3</sub> Gn <sub>4</sub> Jk <sub>4</sub>	Botad	750	150	50	66	na	7	44	na	7-3	57	na
11- D.Co. /W	Palitana Bhavnagar	735 1462	498 14	100 sl	62 62	32 30	7 7	34 37	18 17	7-3 7-3	46 47	24 23
$Jk_3B_4Gn_4/W_4$ $Gn_3B_3$	Ghogha	437	100	10	61	31	7	36	19	7-3	46	23
C113D3	Talaja	870	100	sl	64	na	7	37	na	6-4	65	na
	Mahuva <b>Mahesana</b>	1220	170	sl	57	32	7	33	17	6-3	43	25
$B_3W_4O_4F_4/Jk_4$	Vijapur	940	150	100	63	na	7	37	na	7-3	53	na
• • • • • • • • • • • • • • • • • • • •	Visnagar	488	131	100	52	na	7	34	na	7-3	46	na
$B_4C_4W_4Jk_4$	Kalol Kadi	487 830	74 50	50 48	69 60	35 na	7 7	48 40	24 na	7-3 7-3	59 53	28 na
	Ahmadabad	000	50	-10	00	710	,	-10	1114	, ,		1144
B <sub>3</sub> Gn <sub>4</sub> C <sub>4</sub>	Dehgam	620	100	50	61	na	7	39	na	7-3	52	na
C. H. W. ID.1	Dhandhuka Dolka	2719 1728	100 47	10 10	61 71	30 34	7 7	38 44	17 22	7-2 7-3	38 59	17 28
$C_3Jk_4W_4/Pd_4$	Sanand	800	50	31	68	32	7	47	21	7-3 7-2	47	21
	Vadodara											
$C_4Mt_4Pd_4Jr_4/Gn_4M_4$	Jambuagam	723	333	150	63	28	; 7	38	14	6-3	49	2
	Gandhi Nagar	C40	100	•				_				
$B_3C_4Jk_4W_5$	Gandhi Nagar <b>Kheda</b>	649	100	50	na	na	na	na	na	na	na	na
W <sub>4</sub> B <sub>4</sub> C <sub>4</sub> Pd <sub>4</sub>	Gambay	1195	32	sl	69	34	7	44	21	7-3	57	27
** 4134C41 G4	Rainfall Zone—VII	221	DIE.		0,7		,		fall Pa			_
	Banaskantha	385				••		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	116111	~4(~2 <u>~</u>	121-4
$B_3Jk_4W_5$	Deesa	1481	205	135	62	28	7	46	19	7-2	46	19
$B_4Jk_4W_4/F_4$	Palanpur	1047	1090	150	75	32	7	55	22	7-2	55	22
$M_4Mt_4W_4F_4B_4$	Danta	857	600	300	86	na	7	56	na	6-4	83	na
	Sabarkantha	14104	W. CO.	200	70		_	40				
$M_3C_4W_5$	Khedbrama	846	450	300	70	na	7	49	na	7-3	64	na 
	Rainfall Zone—VIII		47.	lit.		••		Rain	fall Pa	ttern—	$E_4(B_2C)$	$E_{2})E_{4}$
n M na n	Panchmahals Shehera	580	176	100	79		7	49		6-4	76	
$B_4M_4Pd_4R_4$ $M_3Pd_4Gn_4/Mt_4/B_4$	Limkheda	1064	533	150	70	na na	7	43	na na	6-3	59	na na
14131 040114/14114/154	Dohad	874		300	81	41	7	48	26	6-4	75	37
$M_4Pd_4Gn_4G_4$	Jhalod	798	378	300	84	40	7	52	25	6-4	79	36
M <sub>4</sub> Pd <sub>4</sub> Gn <sub>4</sub> Mt <sub>4</sub> /B <sub>4</sub>	Lunavada	946	244	300	78	37	7	51	24	7-3	65	30
	Vadodara											
$C_3Jr_4Pd_4To_4/Mt_4$	G 1'	700	50	40	0.		_					
(D. To.)	Savli	792	50	10	81	na	7	<b>5</b> 3	na	7-3	69	na
(B <sub>4</sub> To <sub>4</sub> )	Rainfall Zone-IX							Rainfi	all Pat	tern_F	7. <b>(4.</b> C	'n.Σ.
	Junagadh			٠.		• •		3,007,0	an 1 (1)	iciii—1	4 (A <sub>1</sub> C	3)1-4
$Gn_1$	Manavadar	592		29	75	na	7	52	na	6-3		na
	Keshod	563	50	10	91	na	7	56	na	6-3	68	na
	Malia	540	150	si	98	na	7	70	na	6-3	87	na
	Talada Mendarda	954 364	150 480	56 150	95 75	na	7	61	na	6-4	92	na
Gn <sub>2</sub> W <sub>4</sub> /C <sub>4</sub> /Jr <sub>4</sub>	Vanthali	393	50	29	93	na na	7 7	55 74	na na	6 <b>-3</b> 6-3	65 86	na 37
G112 44 4/ C4/31 4	Junagadh	677	1117	150	84	40	7	53	25	6-4	80	na
Gn <sub>3</sub> JK <sub>4</sub> F <sub>4</sub>	Mangrol	566	10	sl	76	na	7	52	na	6-3	63	na
4	Surat											
$Jk_3C_4Gn_4Pd_4/Fr_4$	Ghorasi	583	10	sl	107	48	7	64	29	6-4	101	45
C <sub>3</sub> Jk <sub>4</sub>	Olpad	687	10	sl	91	42	7	53	26	6-4	85	39
^	Bharuch Amad	165	ĒΩ	10	ຄາ	27	-	٠.			=-	
$C_1$	Amod Jambusar	465 1097	50 10	10 sl	83 75	37 36	7 7	51	23	6-4	78 61	34
$C_2J_{\Gamma_4}$	Vagra	884	10	sl	81	38	7	48 49	23 23	7-3 -64	61 75	29 35
	Bharuch	666	10	sl	88	40	7	5l	24	6-4	82	35 37
$C_3 J_{K4}$	Hansat	399	10	si	83	37	7	50	22	6-4	78	34
$C_3$ Jr <sub>4</sub> Jk <sub>4</sub>	Ankleshwar	414	10	sl	94	43	7	56	26	6-4	88	40

APPENDIX 3 (Contd.)

		APPENDIX	3 (Co	nid.)								
Cropping patterns	District/taluk	Geog- raphical	Elava (masl			ıal raiı		-	-		utive n	
		area - (sq km)	max	min	total (cm)	rđ	mmr	mr	nd	a	ь	c
	Rainfall Zone—X				•		Rai	nfall	Pattern	$-E_4(A$	$_{1}B_{1}C_{1}B_{1}$	$E_1)E_4$
B <sub>3</sub> Pd <sub>4</sub> Mt <sub>5</sub> To <sub>4</sub> /W <sub>4</sub>	<b>Klieda</b> Mehmedabad	497	50	30	88	39	7	60	26	6-4	84	36
13F04IVI(5104/W4	Nadiad (Kheda)	663	50	29	79	37	7	55	25	7-3	67	31
$Gn_4B_4C_4Pd_4$	Kapadyan	985	102	100	80	37	7	55		7-3	68	30
	Sabarkantha											
$M_2 Pd_4$	Vijaynagar	456	450	300	84	na	7	47	na	6-4	69	na
$M_4C_4Pd_4Gn_4B_4/W_4$	Bhiloda	724	450	300	ла	na	na	na	na	na	na	na
C 7 C	Meghraj	545	300	150	76	na	7	51	na	7-3	68	na
$Gn_3B_4C_4$	Prantiji	824	150	100	74	35	7 7	52	24	7-3	63	29
$Gn_4B_4M_4C_4$	Himatnagar Modasa	771 867	240 150	150 100	79 83	36 38	7	56 58	25 25	7-3 7-3	68 70	30 31
0114B41V14C4	Malpura	368	150	100	67	na	7	44	na	7-3	61	na
	Bayad	737	150	100	78	37	7	55	25	7-3	67	30
$C_4Gn_4M_4B_5$	Idar	1135	490	150	97	41	7	72	29	7-3	84	35
. 4 . 5	Ahmedabad											
B <sub>4</sub> Jk <sub>4</sub> Pd F <sub>4</sub> /W <sub>4</sub>	Ahmedabad	287	73	63	78	37	7	55	24	7-3	67	30
7 7 7	Daskroi	699	66	50	na	na	na	na	na	na	na	na
	Rainfall Zone—XI	· (50)	E91. · ·				R	ai <b>nfal</b> l	Patteri	$t-E_4(z)$	$A_1B_1$ C	$(2)E_4$
	Kheda	ATM COL		1			_					• •
$Pd_3W_4B_4C_4$	Mator	577	39	29	73	35	7	50	23	7-3	61	28
$B_3Pd_4Mt_5To_4/W_4$	Barsad	609	10	sl	89	38	7	58	25	6-4	85	36
C P Pd M /To	Petlad	474 660	30 100	10	86 78	na - 36	- 7 7	59 53	na 23	6-4 7-3	83 66	na 30
$C_4B_4Pd_4M_4/To_4$	Thasra Balasinor	552	100	50	91	38	7	61	25 25	6-4	87	35
$To_3B_4Pd_4$	Anand	676	50	10	88	38	7	60	25	6-4	85	36
	<b>Panchmalials</b>	4-3	MARK TO	S			_					
$M_3Pd_4Gn_4/Mt_4/G_4$	Santrampur	1360	294	150	99	42	7	68	28	6-4	95	39
	Godhra	1019	281	50	103	43	7 7	68	28	6-4	99	40
G BIRG	Devgad Baria Kotol	1145° 398	300 100	150 50	103 105	47 42	7	65 71	30 27	6-4 6-4	98 101	44 39
Gn <sub>4</sub> Pd <sub>4</sub> B <sub>4</sub> C <sub>4</sub> C <sub>4</sub> Pd <sub>4</sub> Mt <sub>4</sub> Gn <sub>4</sub> /J <sub>F4</sub>	Halol	519	829	100	111	45	7	73	29	6-4	107	42
C4EU4WR4OH4/514	Bharuch	10171	0001	100	121	.5	•			0 1	107	
7 D. C. W.		400	598	150	20.00		13.50		20	<b>n</b>	12/2	
$J_{\Gamma_4}Pd_4C_4Mt_4$	Sagbara Jhagadia	813	450	50	na 90	na na	na 7	na 57	na na	na 6-4	na 88	na na
$C_2 Ir_4$	Valia Valia	514	150	50	127	53	7	77	32	6-4	119	49
C <sub>3</sub> Jr <sub>4</sub> Jk <sub>4</sub> C <sub>3</sub> Jr <sub>4</sub> Pd <sub>4</sub>	Nandod	1131	476	50	98	47	7	59	29	6-4	92	43
C33141 G4	(Rajpipla)											
C <sub>4</sub> Pd <sub>4</sub> Jk <sub>4</sub> Mt <sub>4</sub>	Dediapada	1023	799	150	111	58	7	82	37	6-4	124	<b>5</b> 5
-44-4	Surat											
Jk <sub>3</sub> C <sub>4</sub> Gn <sub>4</sub> Fd <sub>4</sub> /Fr <sub>4</sub>	Mangrol	782	150	10	122	52	7	77	33	6-4	114	48
	Vadodara											
$C_1$	Sinor	293	50	10	95	na	7	65	na	7-3	85	na
$\mathcal{C}_1$	Dabhoi	633	100	50	111	47	7	71	30	64	105	44
	Karjan	602	50	10	88	na	7	56	na	7-3	75	na
$C_2Jr_4$	Vaghodia	565	100	50	91	na	7	60	na	6-4	90	na
C <sub>3</sub> Jr <sub>4</sub> Pd <sub>4</sub> To <sub>4</sub> /Mt <sub>4</sub>	Vadođara	670	50	10	92	40	7	58	25	6-4	86	37
$(B_4To_4)$	Padra	535	10	si	118	na	7	74	na	6-4	113	na
	Paura Rainfall Zone-–XII		10		110				l Pattei			
		• •		••		• •	11	sing ar		134	,12 <b>-</b> 10 [	1-4
	Vadodara	700	200	150	104	** *	n	61		<i>C</i>	102	
$C_2Jr_4$	Sankheda	723 245	300 300	150 150	106 109	na na	8 7	61 70	na	6-4 6-4	103 106	na
- r D:	Tilokwada Nasvadi	532	300	150	na	na na	па	na	na na	0-4 na	na	na na
C <sub>3</sub> Jr <sub>4</sub> Pd <sub>4</sub>	Chhota-Udaipur	1379	300	150	118	53	7	78	34	6-4	112	11a 49
$C_4Mt_4Pd_4Jr_4/(Gn_4M_4)$	Paculmahais											
C <sub>4</sub> Pd <sub>4</sub> Mt <sub>4</sub> Gn <sub>4</sub> /Jr <sub>4</sub>	Jambughoda	146	<b>42</b> 7	300	126	52	7	84	34	6-4	120	49

40
APPENDIX 3 (Concld.)

Cropping patterns	District/taluk	Geog-	Elevati (mas		Ann	ual raii	nfall		*0	onsecu	itive mo	onths
		area (sq km)			(cm)	rd	mmr	mr	nd	a	b	c
	Rainfall ZoneXI	I(contd) .					F	Rainfall	- Patte	rn-E	$_{4}(A_{2}B_{1}C_{2})$	$C_2)E_4$
	Surat											
Pd <sub>4</sub> Jk <sub>4</sub> Gn <sub>4</sub> Pu <sub>4</sub> /Mt <sub>4</sub>	Sangadh	853	450	100	157	68	7	104	45	6-4	149	64
	Vayara	813	300	50	161	na	7	112	na	6-4	160	na
Pd <sub>4</sub> Jk <sub>4</sub> Gn <sub>4</sub> C <sub>4</sub> Pu <sub>4</sub> /Mt <sub>4</sub>	Palsana	201	10	sl	146	na	7	98	na	6-4	144	na
Jk <sub>4</sub> Pd <sub>4</sub> C <sub>4</sub> Gn <sub>4</sub> /Fr <sub>4</sub> /Pu <sub>4</sub>	Mahuva	354	50	10	159	na	7	100	na	6-4	153	na
- 4 4 4 4	Valod	202	100	50	143	61	7	94	39	6-4	136	57
Jk <sub>3</sub> C <sub>4</sub> Gn <sub>4</sub> Pd <sub>4</sub> /Fr <sub>4</sub>	Mandvi	731	150	50	134	57	7	87	36	6-4	128	54
Jr <sub>2</sub> Gn <sub>4</sub> W <sub>4</sub>	Nizar	400	150	100	na	na	na	na	na	na	na	na
Jr4 Pd4 Mt4C4	Uchhal	324	300	100	na	na	na	na	na	na	na	na
C <sub>4</sub> JK <sub>4</sub> Pd <sub>4</sub> Fr <sub>4</sub> /Pu <sub>4</sub>	Kamraj	379	50	10	na	na	na	na	na	na	na	na
	Bardoli	379	50	10	134	58	7	86	37	6-4	127	55
	Rainfall Zone-XII	<i>'</i>						Rain	fall P	attern-	$-E_4(A_2$	$B_2$ ) $E_1$
	Valsad											
Pd <sub>3</sub> Pu <sub>4</sub> Jk <sub>4</sub> /R <sub>4</sub>	Gandevi	284	10	sl	180	na	7	127	na	6-4	177	na
1 -31 -401-41 - 14	Chikhli	575	100	10	169	67	7	110	43	6-4	161	63
Pd <sub>3</sub> Jk <sub>4</sub> R <sub>4</sub>	Bansda.	_600	675	50	188	75	7	130	47	6-4	181	70
Jk <sub>4</sub> C <sub>4</sub> Pu <sub>4</sub> Pd <sub>4</sub> u	Navsari	136	50	sl	146	56	7	89	35	6-4	138	52
	Rainfall Zone-XIV			b.				Rain	ıfall P	attern-	$-E_4(A_3$	$B_1)E_i$
	Valsad	12/2/2		T.F.								
Pd <sub>1</sub>	Umbegaon	361	100	sl	151	63	7	93	32	6-4	144	95
Pd <sub>2</sub> Fr <sub>4</sub>	Parli	428	50	sl	184	70	7	119	44	6-4	177	6
	Valsad	510	50	sl	181	66	7	113	41	6-4	173	63
$Pd_3Pu_4Jk_4/R_4$	Dharampur	1650	682	100	241	78	7	169	49	6-4	232	7.
	Dangs	Control of	100.15	'n								
R <sub>3</sub> Mt <sub>4</sub> O <sub>4</sub> Pd <sub>4</sub>	Ahua	1683	1053	300	178	82	7	117	50	6-4	168	75

सन्दर्भव तपनी

Area under Principal Crops—1968-69
GUJARAT

	GUJAKAI	(000'ha)
District/Taluk	Gross cropped pd Jk Jr B M R W Ba Mt G T Pu S Gn O	C To F Misc
	Rainfall Zone—! Rain	Rainfall Pattern— $E_4(C_1D_1E_2)E_4$
Kutch		
Mundra	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Amjar	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Abdosa		
Ropar		$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Bhachau		$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Lakhpat		
Bhuj	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{pmatrix} 3 & -1 & 20 \\ -1 & -20 & (25) \end{pmatrix}$
Mandvi	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	(8) (-) (10)
Nakahtnan	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Jamnagar		
Okhamandal	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1 1
Kalyanpur	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
;	Rainfall ZoneII Ra	Rainfall Pattern— $E_4(C_1D_3)E_4$
<b>Amrel</b> i Libya		10
Lathi	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
Pd = paddy Jk = jowar kharif Jr = jowar rabi	M= maize       Gr=gram       O=other oilseeds         R=ragi       T=tur       C=cotton         W=wheat       Pu=other pulses       To=tobacco	nil or negligible
B=bajra	S=sugarcane Gn=groundnut M	
Morro . 1 Diames in handled	Commence of the contract of th	

Notes: 1 Figures in brackets represent percentages to gross cropped area.

2 The percentage figures have been rounded offindividually and hence cross totals may not, in some cases, add upto 100.

						Ari	END	- + K	Conta										(000°ha)	ha)
District/taluk	Gross cropped area	pd	*	Jr	æ	×	æ	≽	Ba	Mt	G	H	Pu	SQ.	Gn	0	C	To	FI	Misc
	Rai	ıfall Z	me—II	Con	cld)			: 3				:	: ,			1 4	all Patt		$E^4(C^1D)^3E^4$	)3E4
Клатьпа	07	IJ	<b>-</b> €	ıÎ	( <u>†</u>	IJ	1	<u></u> 53	I ]	1	1	18	<u>;</u>	l 🗍	184 187		33	1	1-1	(58° c
Dhari	74	II	වම	$\widehat{\mathbb{J}}$	වුණු	1]	1]	362	ΙĴ	1]	1 ①	ΙĴ	<del>-</del> E	-E	35 (47)		-9	ΙĴ	1 1	11 (91)
Amreli	9/	11	9 (11) (-) 8 (-)	0.5)	16 (21)			30,5			1]	1		333	(41)	(B <sup>-</sup>	@ <sup>7</sup> 3	1		
Babra	58	1 ]	10 (18)	1	-Ξ	1 ①	1	-6	1	1	1 ]	1 ]	1 ①	1	33		83	1	1	613
Bhavnagar	0		t		· ·			• •						· •	į		, ,		,	
Savarkundia	00	1 ①	`@`	1	38	1 ①	1	ලි	1	1	1	l ĵ	ΞΞ	Ξ	(43)	$\widehat{\mathbb{S}}^{r}$	, <del>(</del>	1		(10)
Gariadhar	41	1 🗍	(17)	11	3,4	1 🗍	1	1]	1	1 🗍	lĵ	1	1 ①	0. 4.⊕	6 <del>1</del> (49)	<del>-</del> 2	~ <del>4</del>	1 ①	1]	1 🧻
Mehsana	Raiı	Rainfall Zon	опе—{.	11		:		:		:		:		:	:R	iinfall	Patter	1—E4(	$C_2D_1E_1)E_4$	1)E4
Chanasma	72	200	18	1	88	10	1	(3)		1	1	1	35	13	_	6 (211	01 25 25	13	۳S	96
Hari	31		3 %		6 8			373			[1]	313	)		_	(m)	(1.4)	013	€ ~ @	<u></u> 60
Sami	95	1]	विद्		15)	10		e E	]]	11		(9.3) (9.3)	9 9 9 9		) (S (S) (S)	378	£ 4.5	[1]	≘−≘	378
Jamagar			,											,		Ì			9	)
Jodiya	52	1 ①	12 (23)	1 ①	(17)	I	1]	9(2)	J.I	1	1 ①	1 ]	1 ①	- <u>6</u>	$\frac{16}{(31)}$	2 <del>(</del> 4)	(11)	1	1	1]
Banaskantha																				·
Vav	96	1	99	1	9 9 9	Ιĵ	1	9. 4. 6.	IJ	IJ	1 🧻	1 [	6	1]	1 [	31	1 [	1 [	∞ €	∞ &
Thrad	124	1	(S) 6	, =Ξ	(38)			44			11	11	99			3‴	]	]	1	33.3
Deodar	94	1	32		( <del>2</del> 52)	]]	1	, ν.Θ	]		] [	]	ુ જ			) <sup>ra</sup> E	)=6		28	60
Santalpur	57	1]	•	11	(§ 18 j	]]		9-3	] [	1]		]]	9-8	11	] [	<u>ე</u> ო	₹ €	]	600	96
Dhanera	95	] [	_	]	59 (5)	]]	]	ွှစ်	11		]]		5.8	]	1]	873	]	]	) "E	) <sub>e</sub>
Radhanpwe	45		30	]]	18			<u> </u>		]			9:0			976	25		325	٦) اع
Kankruj	75		(21)		(38) (38) (38)		11	<u>678</u>				$\mathbb{C}^{1}\mathbb{C}$	<b>3</b> 75			E - E	€€		§°®	] [22]
Surendranggar	Rai	Rainfall Zon	one—I	7		•		•			:	•		٠		Rainfa	ıll Patı	tern—E	$C_2^{C_2D}$	$_{2})E_{4}$
Sayla	26	1]	9	1 [	18	1]	1 [	<sub>-</sub> 6	1	1]	1	1 [	$\tilde{c}^{1}$	1 [	90	8 6	10	1	4 8	16
Dasada	108		(£3)		<u>}</u> ∞®			6-3					(G <sup>-</sup> (E		(16)	(S <sup>3</sup> )	10 (18)		€4€	(21)

APPENDIX 4 (Contd)

3 <sup>1</sup> 3 <sup>5</sup> 3 <sup>7</sup>	$(3) \frac{1}{(2)} $	2 <del>4</del> <del>2</del> <del>8</del> <del>8</del> <del>8</del> <del>8</del> <del>8</del> <del>8</del> <del>8</del> <del>9</del> <del>1</del>	1 1 2 2 4 3 1 1 1 2	И
(S.) (J. (B.)	$\begin{array}{c} -\\ (-)\\ (2)\\ (2)\\ (3)\\ (8)\\ (8)\\ (8)\\ (8)\\ (15)\\ \end{array}$	(E)		9 (15)
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58 (48) 31 (49) (35)	3 (14) 7 (12) 3 (7) (7) (6) Patter	Î - 3   Î - E   Î   Î - 3	25 15 15 15 15 15 15 15 15 15 15 15 15 15	9 (15)
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(29) (14) (11)	(5) (16) (16) 9 9 (22) 18 (45)	2 (5) 2 2 3 3 4 7 7 7 7 7 7 7 8 8 8 2 2 9 16 6 16 16 16 16 16 16 16 16 16 16 16 1	4 <u>@</u> 7 <u>8</u> 6 4 <u>8</u> 7 <u>8</u> 7 <u>8</u>	1 ①
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Khambhaliya

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Dhrol

Janagadh Una

Lalpur

Kalavad

Jamjodhpur

Jamnagar Bhanvad

Vallabhipur

Sehor

Bhavnagar Umrala Godhada

Wadhwan

Muli

Linildi

Ranavav Kutiyana

Patan Veraval

Visavadai

Bhesan

Porbandar

(000'ha)

APPENDIX 4 (Contd.)

District/Taluk	Gross cropped pd		M	R W	/ Ba	a Mt	<u>ت</u>	Ţ	æ	S	5	0	ပ	To	ц	Misc.
Amreli	17	V (Contd).	1					1	4-0			Rainfall	fall Pattern—		$E_4(B_1C_1E_2) E_4$	) E.
Kodinar	(3) (3) (3)	-		-	_	_	_	<u> </u>	Ξ"			£ 3	ں ج		9. 1	<u> </u>
<b>Raj</b> цla								1	3,6			'ల్	1		1	<u>1</u> 2
Jafrabad	24 - 3 - (12) (-)		1	1 (1)	1	1	1	1	3	1	(17)	(17)	1)		17.	1 ]
Kunkavadia								1	1			1 ①	G		3,5	1
Rajkot				•					١			i	~		,	
Dhoraji	43 0.3 1 — (1): (2) (1)	୯ ହ	5 € 1	- (- - (-)					1	· 3 ·		1	3		- <u>6</u>	^ E
Jetpur	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	. I (L . I (T	-1 (J.  4⊗					1 1	· ②		Iĵ	<del>-</del> 2		~ €@	1 [
Jamkondorva	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	۳E	11	- - - - -					l ĵ	1		1	(2)		- <u>G</u>	1 1
Gondal	°E	36	10						1);	1 ①		1	43		1]	3.2
Loduika	(E)	<u> </u>	70	(1) (1)					:E	1		1 🕤	33		17	:55 :55
Paldhari	4 (1) (1) (1) (1) (1) (1) (1) (1)	23.5							1]	11		1 ①	·6		17	1]
Kotda-Sangahi	29 0:3 (3) (1) (10)	19							1 1	1 🗍 '		1 ①	95		, ç <u>ı</u> Ə	1
Upleta	(7E)	∞ ⊗	· J T	1 T					1)	è		1	E (§)		(5)	7-8
Rajkot	66 (1) (15) (1) (15)	. 6 <u>8</u>	11	11					<b>-</b> 3.	١ [] .		1	37		35	213
Jasdan	87 - 13 - (15) (-)	(21)	11	11					Ξ	-Ξ		-Ξ	30		11	
Morvi	<b>4</b> (61)	¥(E)	1]	) [ (3) 3)	1 <u>]</u>	1 ]	1 ]	1	11	1	(30)	Ξ,	(58)		11	Ê
Wankawr	56 _ 9 (-) (16) (-)	14 (25)	17	1)					(2)	1		Ξ-	s (9)		5 5 5	1
Miyana	50 - 12 - 12 - (-) (24) (-)	02)		1 ]					1	1		£	£6 £	1]	1 ]	1
Sarenranagar									r		:					
Ghotila	58 — 5 — (9) — (-)	19 (33)							(£)	1	(54)	1	35		13 (23)	-8
Lakhtar		, 1 (12)							11	1	1 [	1	ΞΞ		0.3	3-5
Halwad		19 (23)					_		ΞΞ	1	<b>4</b> €	1 🗓	33		11	27
Dhrangadhra	89 (-) 20 (-)	18 (20)	<u>.</u> []	1 ①	1 🗍	1	11	1 1	Ξ,	1 ①	43	7	<b>4</b> 8			9-3

8 9 7 (9) 8 (11)	1 ①	(1) $(1)E_4$	_01_02=0.3~0	11 8 (12) 8 (4) 10 (13)	2,43,43	7 (14)
5.3.3.3.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.	<b>1</b> (2)	$(4)$ $B_1C_2E$	$\widehat{\mathbb{G}}_{2} \cdot \widehat{\mathbb{G}}_{2} \cdot \widehat{\mathbb{G}}_{3} \cdot \widehat{\mathbb{G}}_{4}$	11. 2. 4. 4. 6. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.	7 <del>.</del> 4. 5. 6. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.	1
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District/taluk	Gross cropped Pd Jk Jr B M R W Ba Mt G T Pu S Gn O C To F Misc area
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#### ERRATA

#### Rainfall and Cropping Patterns

#### Volume IV

#### GUJARAT

Page No.	Paragraph/Table/ Appendix No.	Line	As printed	As desired
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13	4·39—statement	Col. 2		The pattern Cm4 Cf4 Cy4
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13	Table 14	Col. 2 last row	155	152
13			n an gr	

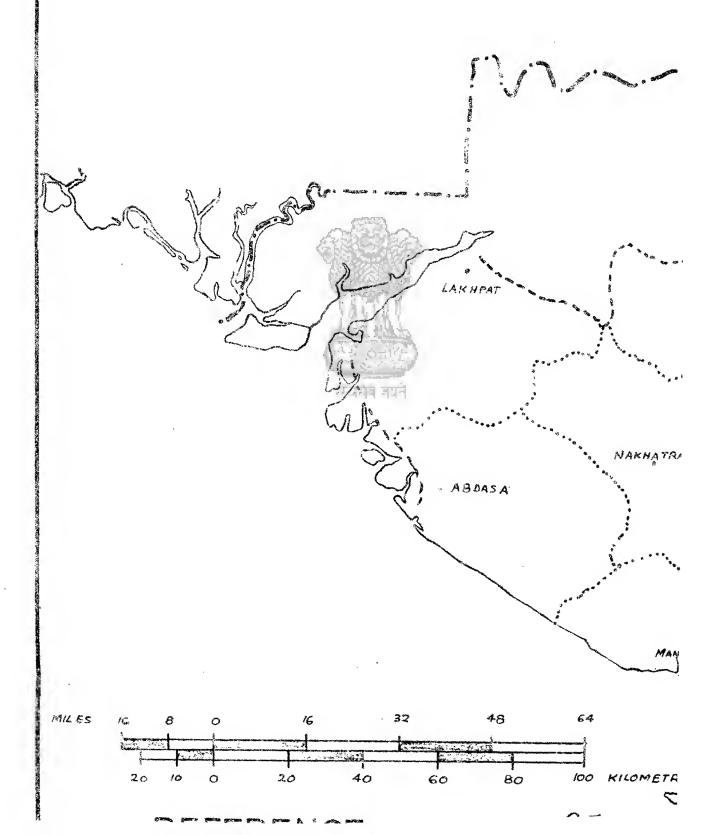
1	2	3	4	5
14	4 · 40	I	comprise	comprises
14	4 ·40—statement	Col. 1	(Vado or)	(Vadodara)
14	4·40—statement	Col. 2 line 5	deepra mediumda	deep or medium
		2 below statement	10-20	by 10-20
14	4 ·40		Month	Months
14	4.42	6		137
15	Table 15	Col. 4 row 3	167	
15	4 -47	7	Main	Mainly
15	4 • 48	7	2 per cent is Khedrahma	42 per cent in Khedrahma
15	4.50	1	2.822	289
15	Table 16	Col. 4 row I	74	73
15	4 *53	Col. 1 row 4	M4 Pd4 Gn4 Mt4/B8	M4 Pd4 Gn4 Mt4/B4
16	Table 17	Footnote-line 3	& 1970-71	to 1970-71
16	4.60	1	district	districts
16	4 ·60 statement	Col. I row 6	C <sub>5</sub>	C <sub>1</sub>
-		Footnote-line 3	& 1970-71	to 1970-71
17	Table 18			Gn <sub>4</sub> B <sub>4</sub> C <sub>4</sub> Pd <sub>4</sub>
17	4 ·68-statement	Col. 1 row 2	Gn <sub>4</sub> B <sub>4</sub> C Pd <sub>4</sub>	
18	4 • 70	1	There are no	One to 8 percent of the reporting area is accounted by
**	4 44 statement	Col. 1 leading	Disctrict	District
18	4.74—statement	Col. Lof table	Kapadvani	Kapadvani )
18	Do.	COR LOI ERDIG	Prantiz	Prantiz
		•	Himatnagar	Himatnagar
* 0	775 m	Col. 1 of table	(Ahmedabad	[Ahmedabad
18	Do.	Cor. For table	Z Daskroi	Daskroi
			Mehmedabad	Mehmedabad
		ACHER Hales	Nadiad	Nadiad
		474	Madasa	
		er i	Malpura	( Madasa
			Bayad	⊰ Malpura
		7 4		Bayad
18	Table 19	Footnote-line 2	Yielde	Yields
18	Table 19	Footnote-line 3	& 1970-7I	to 1970-71
18	4 · 75—statement	Col. 1, last row	C <sub>3</sub> Jr <sub>5</sub> Pd <sub>4</sub> To <sub>4</sub> 'Mt <sub>4</sub> (B <sub>4</sub> To <sub>4</sub> )	C <sub>3</sub> Jr <sub>4</sub> Pd <sub>4</sub> To <sub>4</sub> /Mt <sub>4</sub> /(B <sub>4</sub> To <sub>4</sub> )
-		11	Halal	Halol
19	4.76	4T 1 17	166	66
19	4 · 76	last	And the second s	
19	4 · 79	6	6-7	6-7 per cent each
19	4.80	4	Jowar.	Jowar (kharif).
19	4.81	Col. 1	44 4 (Valia	<b>J</b> Valia
			√ Jaghodia	Jaghodia
			Santrampur	Santrampur
19	Table 20	Col. 5 row 6	191	181
21	4 ·92	1	150	more than 150
21	4 ·95—statement	Col, 1	( Navsari	[Navsari
<u>~ ;</u>	4 yourselfer		√ Gandevi	Gandevi
			[ Chikhli	Chikhli
21	Table 22	Col, heading	area per cent	area
21	4 ·96—statement	Col. 2	(Umbergaon	Umbegaon
4.	- 10 State High	The Grant and	Pardi	Pardi
			Valsad:	Valsad
21	4.97	3	about 1,680	over 1,650
	4.99	2	200	178
22		•	inculdes	includes
22	4-100, col. 2	<u>:</u>		
22	4 · 102	1	theis	this
22	5 · 1	11	coud	could
22	5.1	21	folowing	following
23	5.7	17	occurs in	occurs. In
24	Appendix I Zone I	Col. 9 row 3	10(42)	101(42)
24	Appendix I Zone III	Col. 1, row 3	Saini	Sami
			8(3)	13(8)
25	Appendix I Zone IV	Col. 9 row 2		
25	Do.	Col. 5 row 9	4(1)	0.4(1)
25	Appendix I Zone V	Col. 10 row 6	68(5)	68(55)
25	Do.	Col. 7 row 8	(15)9	15(9)
25	Do.	Col. 9 row 10	0 ·4(4)	0 ·4(0 ·4)
and a		Col. 6, row 26	4(1)	0.4(1)
	130			
25 25	Do. Do.	Col. 10 row 29	1227(3)	122(73)

1	2	3	4	5
26	Appendix 1 Zone V	Col. 10 row 1	57(45)	57(54)
26	Do.	Col. 7 row 3	7(10)	7(6)
26	Appendix I Zone VI	Col. 5, row 11	0.1(1)	0.1(0.1)
26	Appendix I Zone VIII	Subheadings	Rainfall Pattern	Rainfall Pattern
			$E_4 (B_6 C_2) E_4$	$E_4$ ( $B_2$ $C_2$ ) $E_4$
26	Do.	Col. 5 last row	(2)3	2(3)
27	Appendix I Zone IX	Col. 10 row 2	39(10)	39(70)
27	Do.	Col. 6 row 8	4(1)	0.4(1)
27	Do.	Col. 5 rows 15 & 16	(2)5	2(5)
28	Appendix I Zone XII	Col. 6 row 3	4(1)	0 ·4(1)
28	Do.	Col. 8 row 9	2(1)	0.2(1)
28	Appendix I Zone XIV	Col. 7 row 5	0 -4(2)	0.4(0.2)
30	Appendix 2 Zone III	Col. 8 row 6	8	8
			(4)	(14) Goats
32	Appendix 2	heading col. 9	Go a	16
32	Appendix 2 Zone VI	Col. 2 row 10	16 (9)	(19)
23	Appendix 2 Zone VI	Col, 1 row 15	Jambnagar	Jambugam
32	Appendix 2 Zone VII	Rainfall Pattern	E <sub>4</sub> (B <sub>2</sub> E <sub>6</sub> ) F <sub>4</sub>	E <sub>4</sub> (B <sub>2</sub> E <sub>2</sub> ) E <sub>4</sub>
.32	Appendix 2 Zone IX	Col. 15 row 1	94	49
33	Appendix 2 Zone X	Col. 1 row 2	Nadki (Kheda)	Nadiad
34	Appendix 2 Zone X	subheading	E <sub>4</sub> A <sub>1</sub> (B <sub>1</sub> C <sub>2</sub> E <sub>2</sub> ) E <sub>4</sub>	E <sub>4</sub> (A <sub>1</sub> B <sub>1</sub> C <sub>1</sub> E <sub>1</sub> ) E <sub>4</sub>
35	Appendix 2 Zone XII	Col. 15 line 13	58	28
37	Appendix 3 Zone V	Col. 1 line 6 against Visavadar	Gn <sub>2</sub> W <sub>4</sub> /C <sub>4</sub> /Jj <sub>4</sub>	$Gn_2 W_4/C_4/Jr_4$
37	Do.	Col. I last row		$C_2 \operatorname{Jk}_4$
41	Appendix 4 Zone 1	Col. 14 row 3	(年) (247).	0.1
71	Appendix 4 Zone 1	Cos. 14 low 3	(4)	(4)
41	Do.	Col. 14 row 10	2 (1)	0.2
-41	Appendix 4 Zone II	Last row		The row should be deleted and replaced by the follow-
	Lathi 53	neg 9 — 13 (neg) (17) (—) (24) (—) (	1 = neg ( -) (2) (-) (-) (-) (neg)	ing: 0.4 23 1 3 — 1 2 (1) (43) (2) (6) (—) (2) (3)
42	Ammandia 4 Zana 11	Rainfall Pattern	E <sub>4</sub> (C <sub>1</sub> D) <sup>3</sup> E <sub>4</sub>	
42	Appendix 4 Zone II	Col. 6 row 1	6 (C1D) E4	E <sub>4</sub> (C <sub>1</sub> D <sub>3</sub> ) E <sub>4</sub>
44	Do.	Cos. 6 fow 1	(14)	(23)
-42	Do.	Col. 6 row 16	ग्याच निर्देश	12
1,500			(48)	(46)
42	Do.	Col. 6 row 21	6	6
	-	•	(28)	(23)
-42	Do.	Col. 13 row 1		<del>-</del> ,
42	<b>73</b> %	Col. donor 2	(1)	()
-42	Do.	Col. 4 row 2	(7) (9)	7 (9)
42	Do.	Col. 6 row.2	2	14
	Book To a		(19)	(19)
42	Appendix 4 Zone III	Col. 17 row I	9	9
			(113)	(13)
42	Appendix 4 Zone IV	last row		The row should be corrected
Das	da 108 neg 25 9		neg neg	as below: neg 72 — 1 —
42	(neg) (23) () ( Appendix 4 Zone IV		) (-) (-) (neg) (-) (neg)	
43	* *	Col. 1 row 1	Linildi	Limbdi
43	Do.	Col. 4 row 1	22 (29)	22 (19)
43	Appendix 4 Zone V	Col. 21 row 4	(2) (3)	2 (3)
43	Do.	Col. 16 row 6	2·5 (35)	25 (35)
42	n <sub>o</sub>	Col. 3 row 9	4	0.4
43	Do.	CVII D IOW 7	(1)	(1)
475	n <sub>o</sub>	Col. 6 row 10	121	8
43	Do,	COL VIUW IV	(15)	(15)
	** -	Col. 18 row 13	151	
43	Do.	Col, to low 15	1421	5

1	2	3	in .	4	5
43	Appendix 4 Zone V	Col. 21 last row		2	2
44		Col. 5 heading			(3) Jr
44		Col. 6 heading			В
44	Appendix 4 Zone V	Col. 5 row 1		0·3 ( <del>-</del> )	0·3 (1)
44	Do.	Col. 9 row 4		(2)	(1) (2)
44	Do.	Col. 16 row 19		<del>-</del>	(1) (1)
44	Do.	Col, 18 row 19		<b>i</b> (i)	38 (63)
46	Appendix 4 Zone VIII	sub-heading		Rainfall Zone VIIII	
46	Do.	row 4			May be corrected as below:
	Jhalod 53 8	0.4 — — 19	_ 4	0.4 4 6 1	$\frac{1}{2} - \frac{8}{2} - \frac{1}{2}$
46	(16) Appendix 4_Zone IX	(1) (—) (—) (35 Sub-heading	) () (7)	(1) (7) (12) (2)	(2) () (15) () () () (2). Give the following subheadings before district Junagarh Rainfall Zone IX Rainfall Pattern E <sub>4</sub> (A <sub>1</sub> C <sub>3</sub> ) E <sub>4</sub> .
47	Do.	Col. 18 row 10		34 (58)	34 (68)
- 47	Appendix 4 Zone X	Col. 1 row 1	e	*****	add district Kheda before taluk Mehmedabad
47	Do.	Col. 18 row 3	ASS	(21)	17 (21)
48	Do.	Col. 12 row 2		1 · 4 (1)	(21) ()·4 (1)
48	Appendix 4 Zone XI	Col. 21 last row		(3) (6)	3 (6)
49	Do.	row 4	\$ 18		add the following line- against taluk Vadodara
49	49 5 5 (10) () (10 Appendix 4 Zone)XIV		( <del>-)</del> (4)	2 neg - (4) (neg) 2 (18)	- neg - 19 6 2 3 (-) (neg) (-) (39) (12) (4) (6)

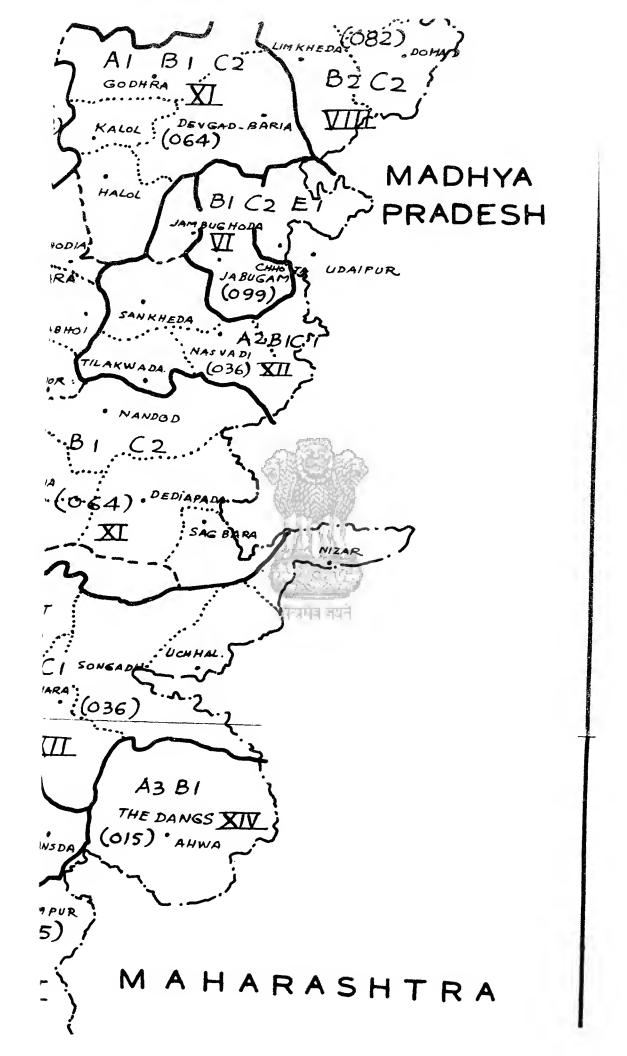
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# GUJARAT RAINFALL PATTERN

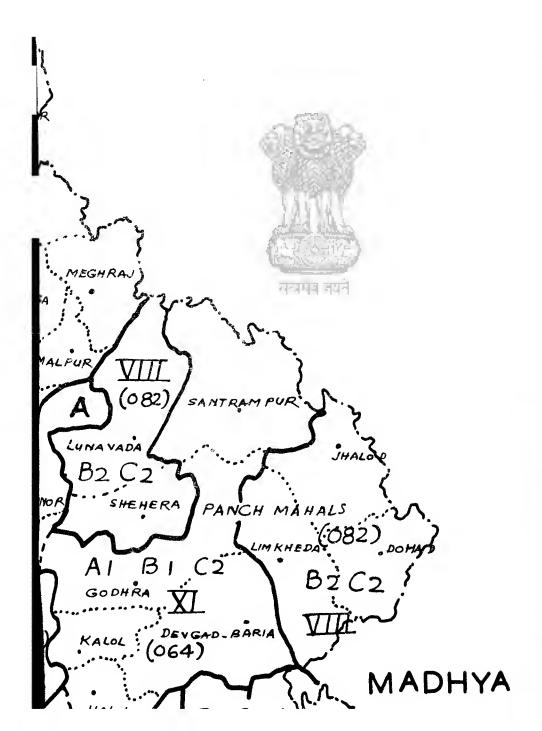


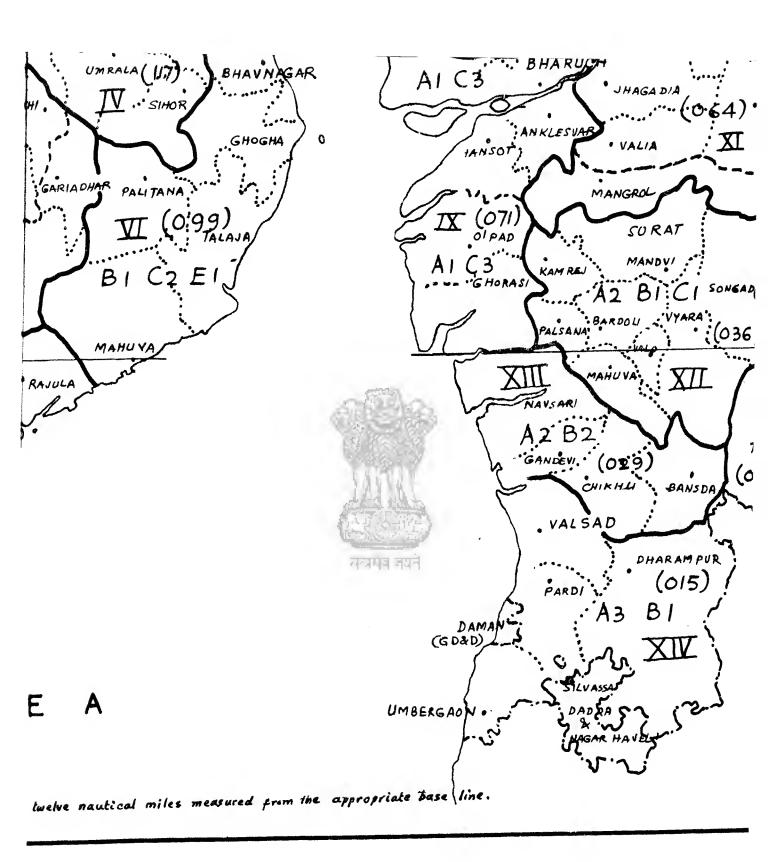


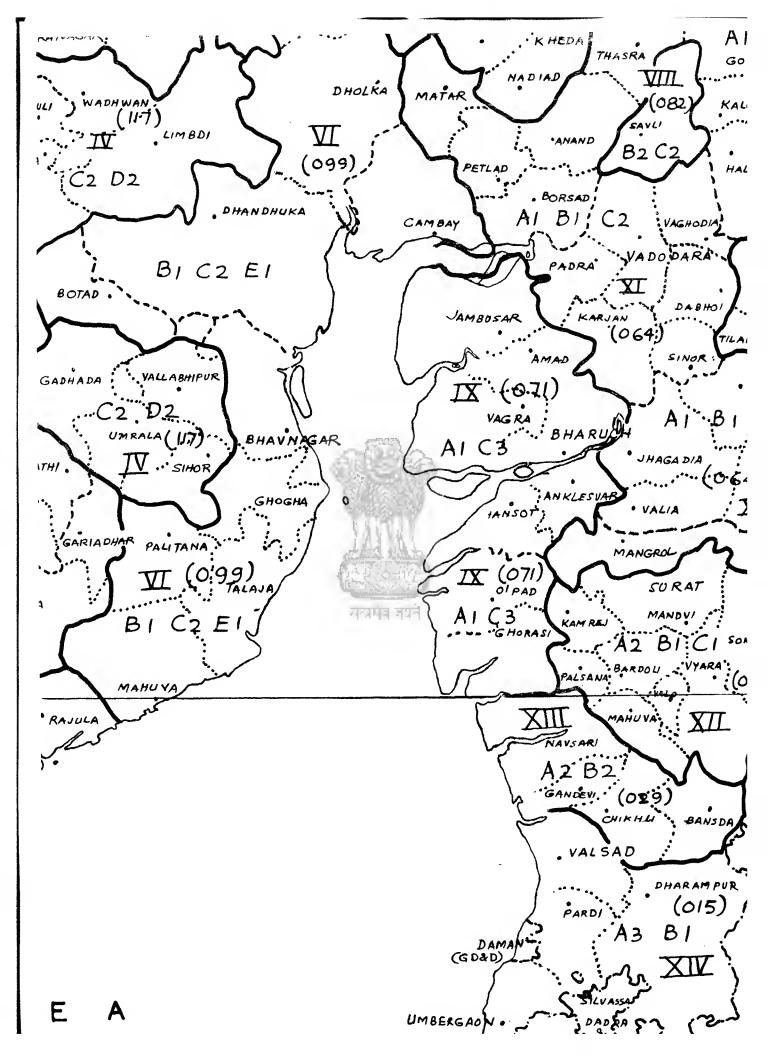
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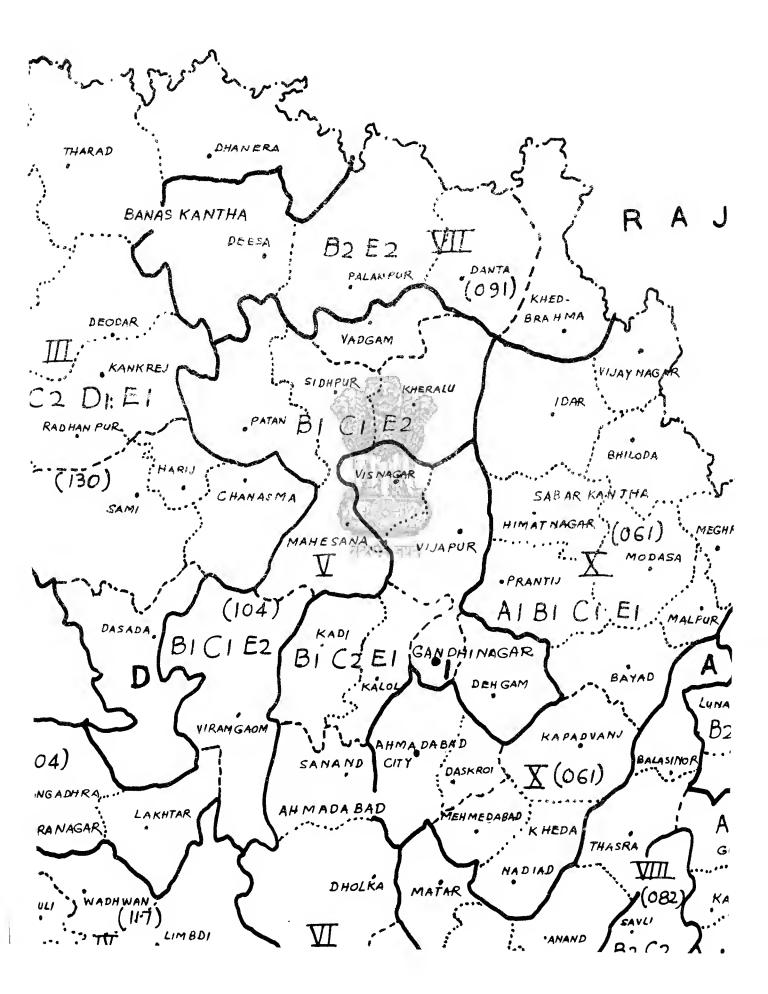


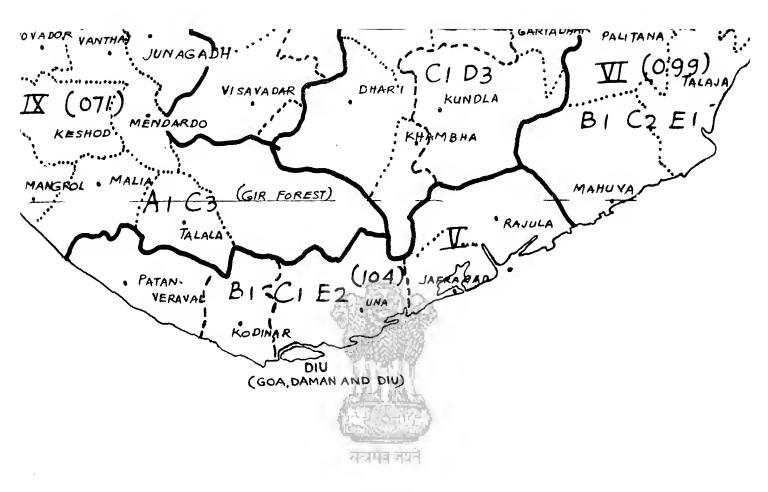
### AJASTHAN









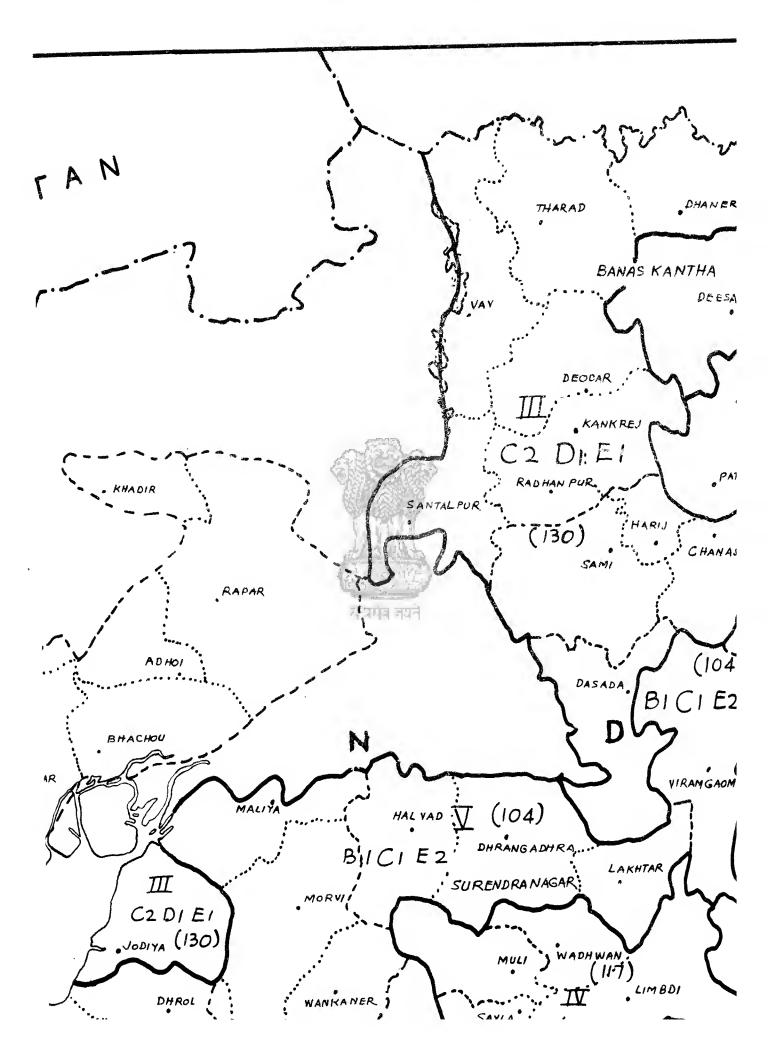


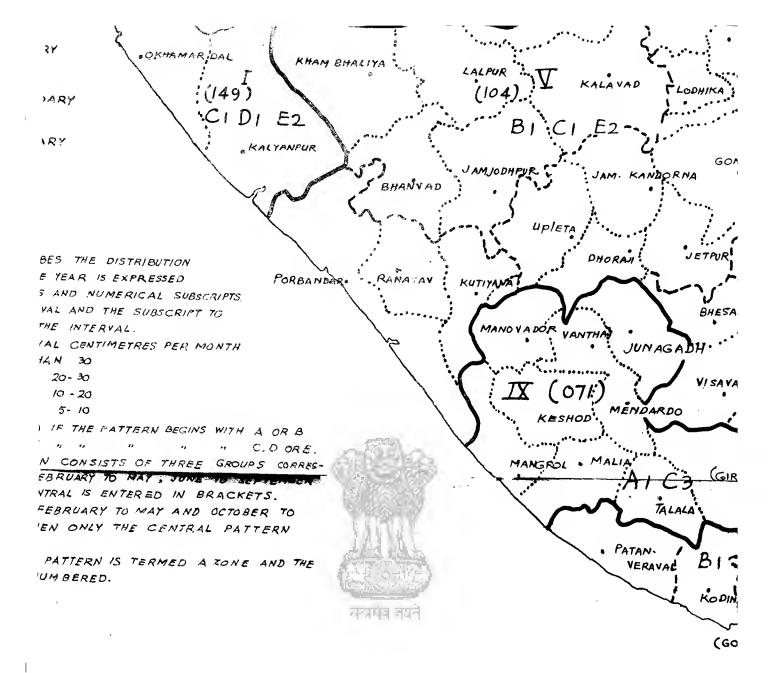
## RABIAN SEA

he territorial waters of India extend into the sea to a distance of twelve nautical miles measured from



RABIAN SEA





RAINFALL ZONES.

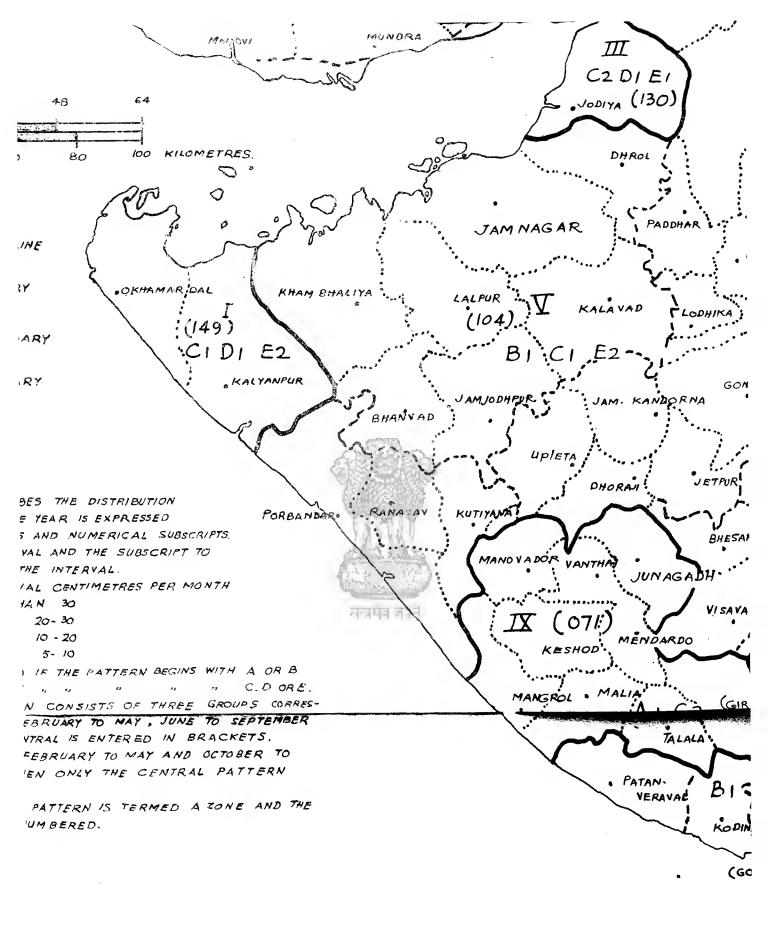
NUMBERS WITHEN BRACKETS GIVE THEIR

NTS.

### ARABIA

with the permission of the Surveyor General of India.

The territorial waters of India extend



RAINFALL ZONES. NUMBERS WITHIN BRACKETS GIVE THEIR NTS.

## JARAT

PAKISTAN PATTERNS KHAVA DA BANNI RAPAR CIMDI E2 KUTCH [ NAKHATRA NA ABDASA "Вни (149). MALIYA MUNORA Ш C2 DI EI JODIYA (130) KILOMETRES. 80 DHROL

.01

DISTRICT BOUNDARY

TALUK BOUNDARY



ZONE

## LEGEND

THE RAINFALL PATTERN WHICH DESCRIBES THE DISTRIBUTE OF MONTHLY RAINFALL THROUGHOUT THE YEAR IS EXPRES. IN CODED FORM WITH LETTER SYMBOLS AND NUMERICAL A LETTER DENOTES A RAINFALL INTERVAL AND THE SUBSEACH LETTER THE NO. OF MONTHS IN THE INTERVAL.

SYMBO	ANN FALL INTERVAL CENTIMETRES
A	GREATER THAN 30
${\cal B}$	20- 30
C	10 - 20
D	5- 10
E	LESS THAN IO IF THE PATTERN E

" " 5 " "

THE CODED FORM OF EACH PATTERN CONSISTS OF T.
PONDING TO THE THREE SEASONS FEBRUARY TO MAY, .
AND OCTOBER TO JANUARY THE CENTRAL IS ENTERED

IF HOWEVER, EACH OF THE MONTHS FEBRUARY TO MAY .
JANUARY IS LESS THAN S CMPM; THEN ONLY THE CEN
WITH OUT BRACKETS IS STATED.

THE AREA COVERED BY A RAINFALL PATTERN IS TERME ZONES IN THE MAP ARE SERIALLY NUMBERED.

ROMAN NUMBERS INDICATE STATE RAINFALL ZONES.
THREE- DIGIT FIGURES IN ARABIC NUMBERS WITHIN BE CORRESPONDING ALL-INDIA EQUIVALENTS.

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#### REFERENCE

ATTERNATIONAL LINE

STATE BOUNDARY

OKHAMARID

DISTRICT BOUNDARY

TALUK BOUNDARY



ZONE

#### LEGEND

THE RAINFALL PATTERN WHICH DESCRIBES THE DISTRIBUTION
OF MONTHLY RAINFALL THROUGHOUT THE YEAR IS EXPRESSED
IN CODED FORM WITH LETTER SYMBOLS AND NUMERICAL SUBSCRIFT TO
EACH LETTER THE NO OF MONTHS IN THE INTERVAL.

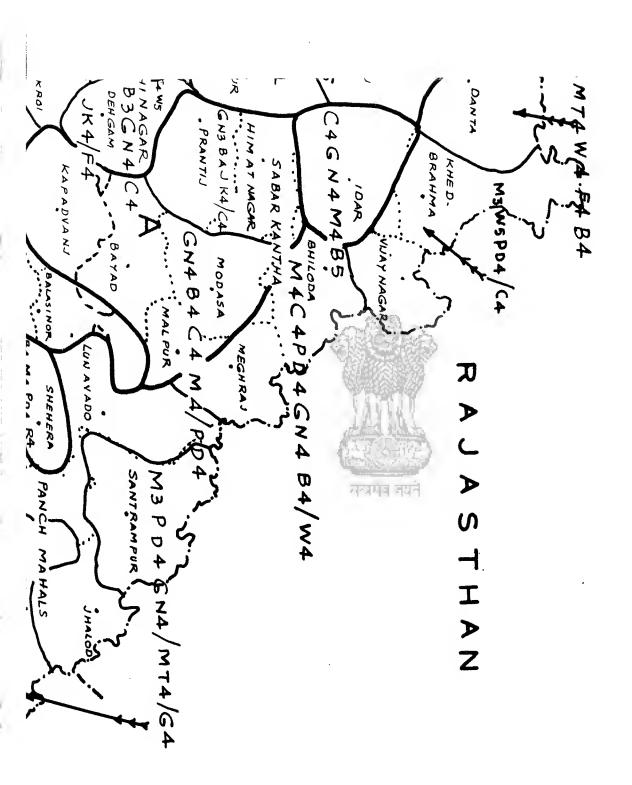
SYM BOL	RAINFALL INTERVAL CENTIMETRES PER MON.
A	GREATER THAN 30
8	20- 30
C	10 - 20
D	5- 10
E	LESS THAN IO IF THE PATTERN BEGINS WIL

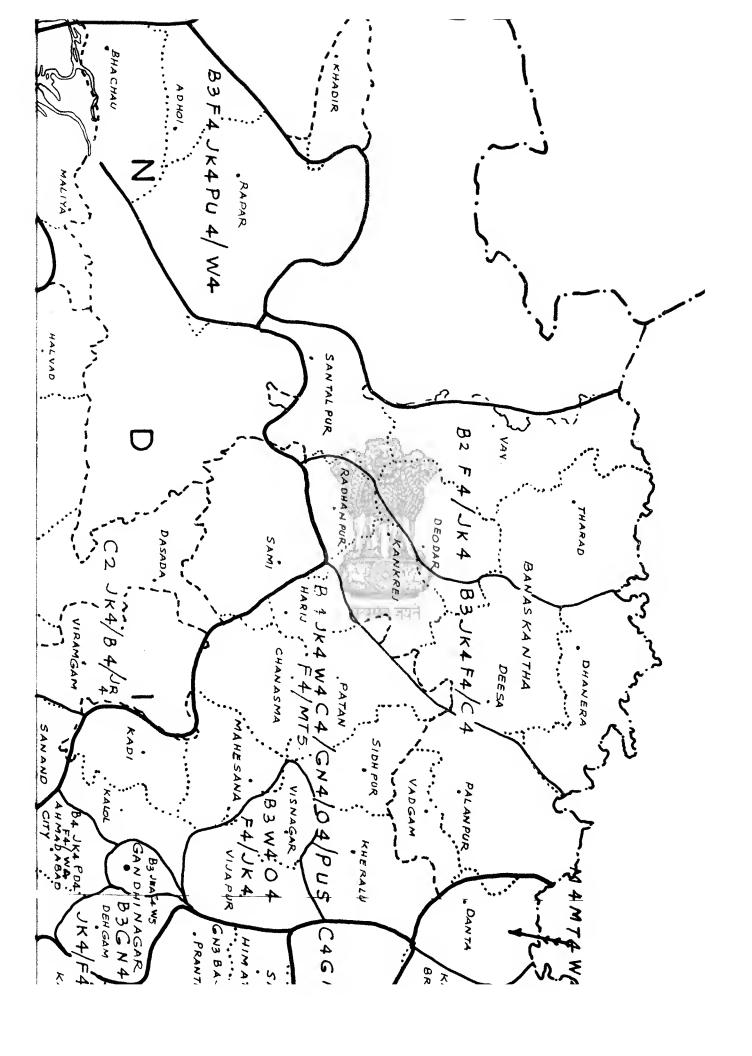
5 " "

THE CODED FORM OF EACH PATTERN CONSISTS OF THREE GAPONDING TO THE THREE SEASONS FEBRUARY TO MAY, JUNE TO AND OCTOBER TO JANUARY. THE CENTRAL IS ENTERED IN BRACIF HOWEVER, EACH OF THE MONTHS FEBRUARY TO MAY AND OCT JANUARY IS LESS THAN 5 CMPM; THEN ONLY THE CENTRAL PWITH OUT BRACKETS IS STATED.

THE AREA COVERED BY A RAINFALL PATTERN IS TERMED A ZO. ZONES IN THE MAP ARE SERIALLY NUMBERED.

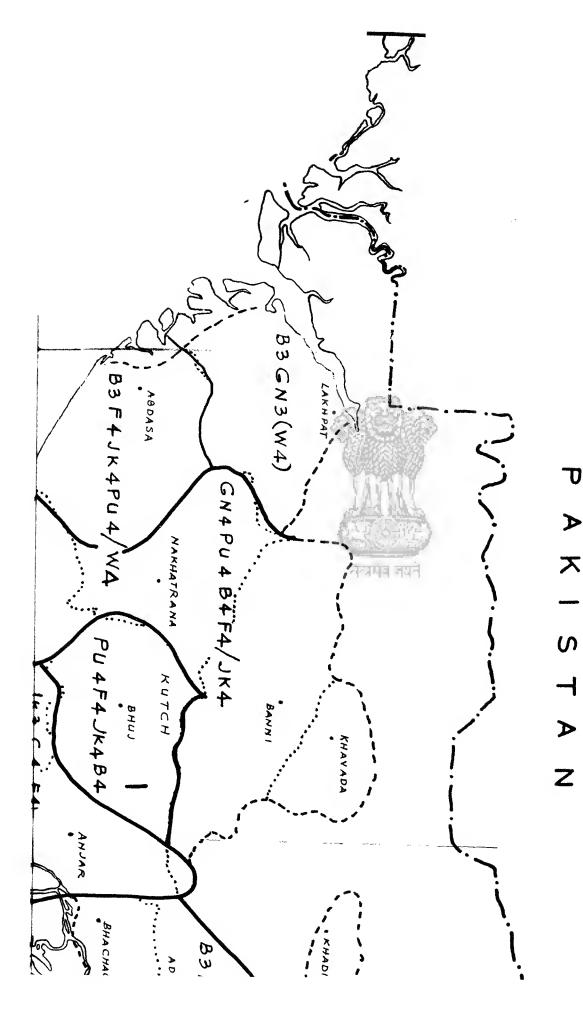
ROMAN NUMBERS INDICATE STATE RAINFALL ZONES.
THREE-DIGIT FIGURES IN ARABIC NUMBERS WITHIN BRACKET
CORRESPONDING ALL-INDIA EQUIVALENTS.

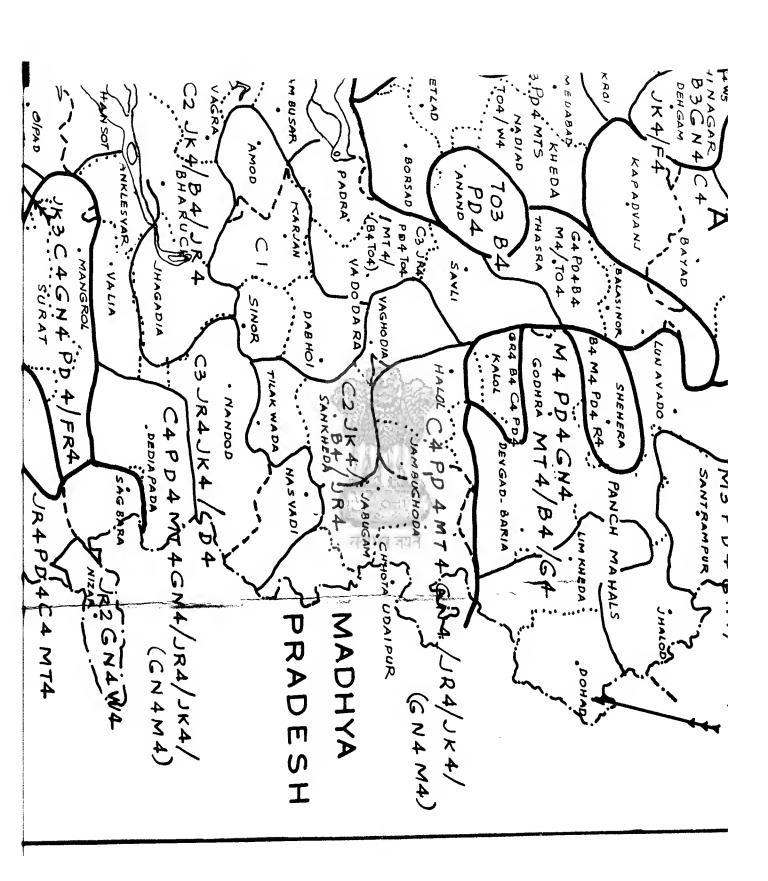


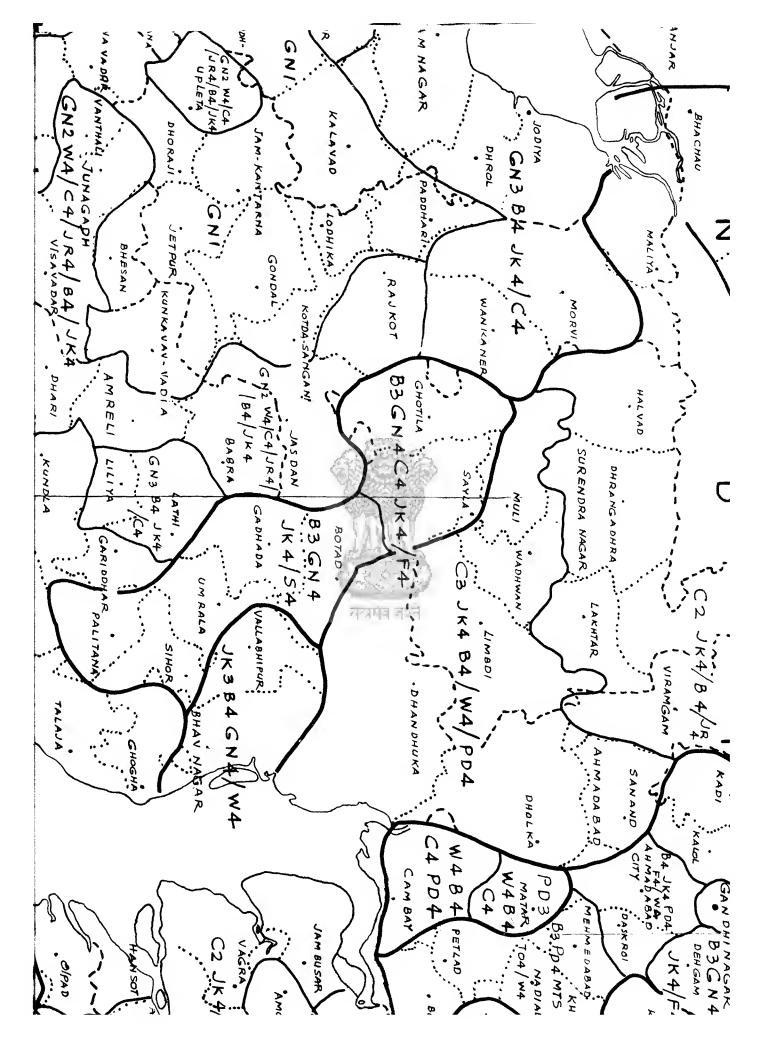


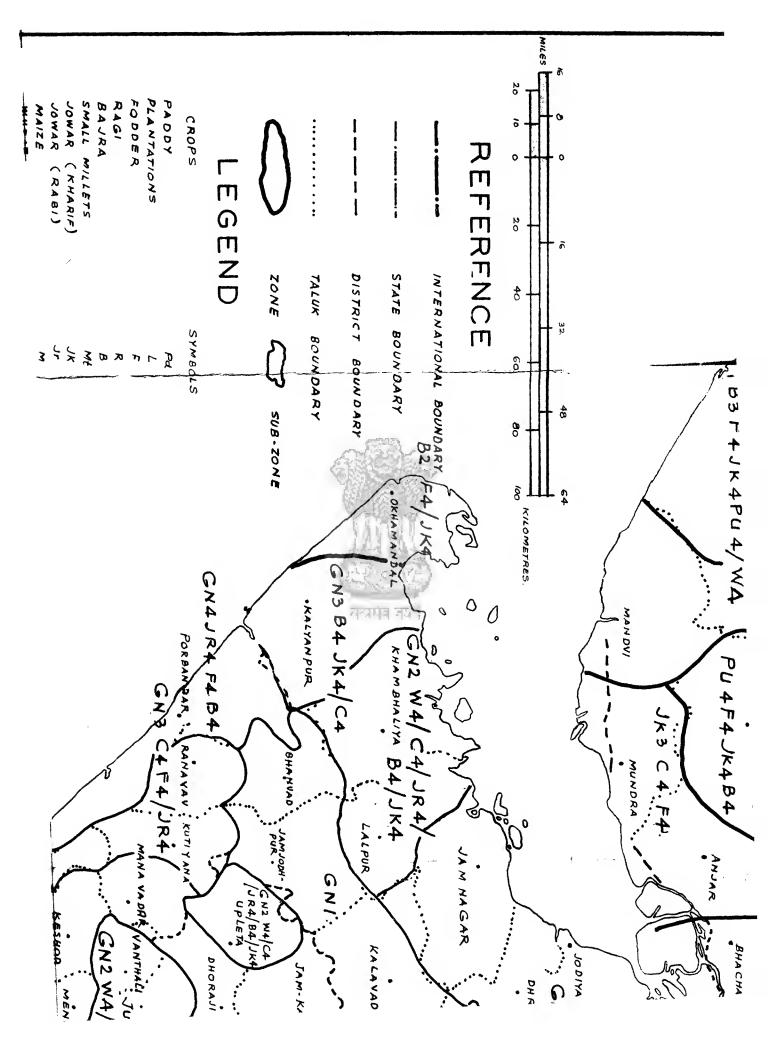
# GUJARAT

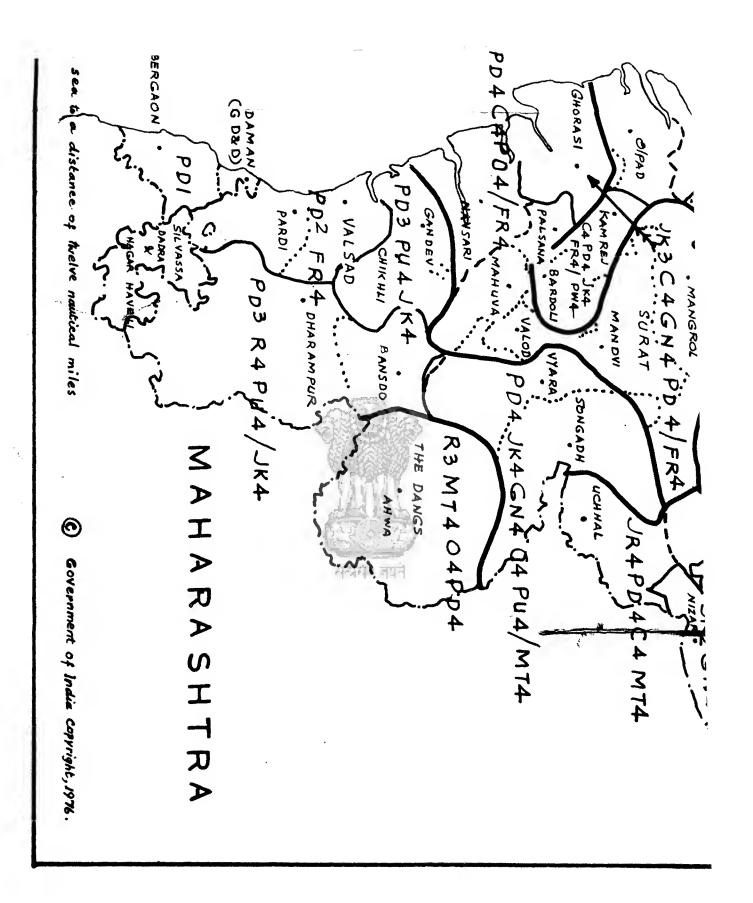
CROPPING PATTERNS

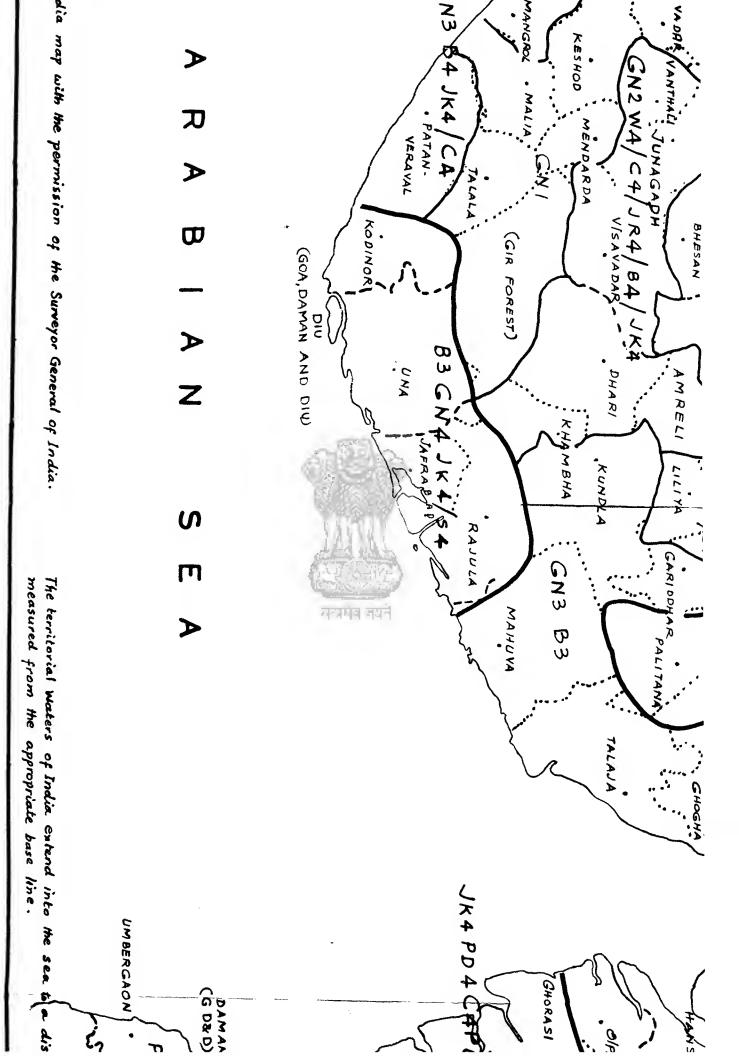












FODDER GROUND NUT RAGI PLANTATIONS OTHER OILSEEDS COTTON SMALL MILLETS PADDY OATS SUGAR CANE OTHER PULSES JOWAR JOWAR BAJRA BARLEY ナロス MAIZE GRAM WHEAT (KHARIF) (RABI) 7 K B B Z Z L ମ Bass 051053 0

CNS

MANGROL

KES!

C+F4/UR4

MANA VADAR

TAHAYAY . KUTIYAHA

OATS
TOBACCO
FRUITS

A CROPPING PATTERN CONSISTS OF ONE OR MORE CROPS, EACH WITH A SUBSCRIPT WHICH INDICATES THE PERCENTAGE AREA OF THE CROP CONCERNED

បា	4	w	и	_	SUBSCRIPT
CESS THAN D	10 - 30	30 - 50	50 - 70	GREATER THAN 70	PERCENT OF GROSS CROPPED
					AREA

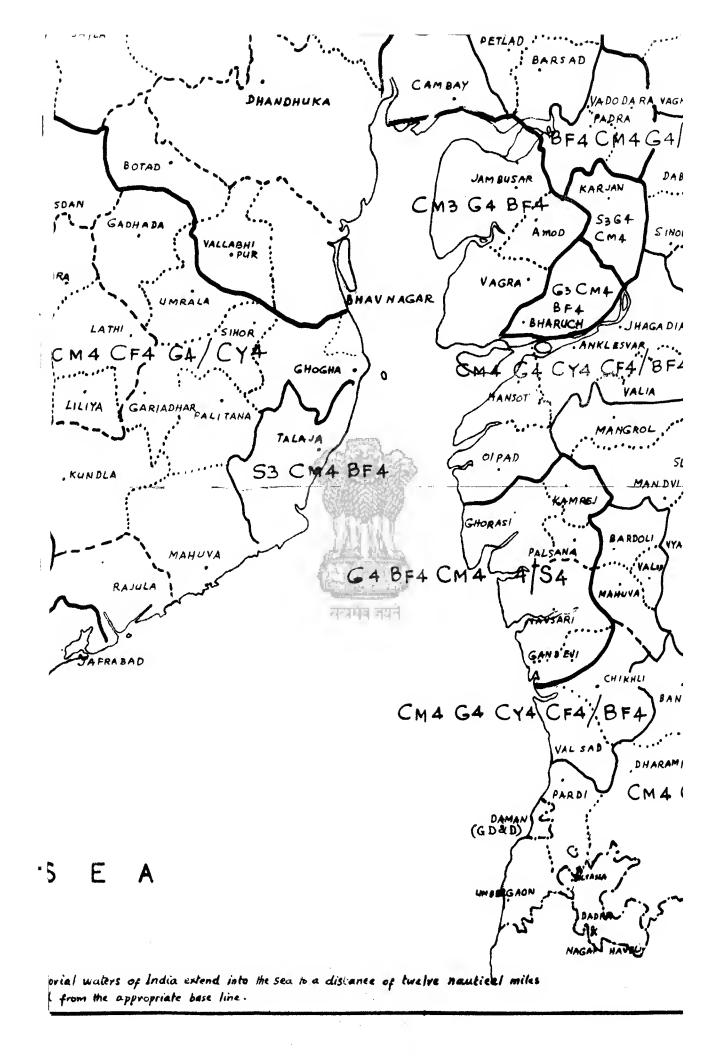
		(2) R		$\mathfrak{S}$	E)
		(2) R2PU4 Pd4		Pal	EXAMPLE:
PADDY	OTHER	RAGI	CROPPE	PADDY (	
PADDY (10-30%) AREA	OTHER PULSES (10 - 30%) AREA	RAG! (50 - 70 %) AREA	CROPPED AREA OF THE TALUK	PADDY COVERS MORE THAN TO PERCENT OF GROSS	
AREA	- 30%) A	AREA	E TALOX	HAN 70 PL	
	REA			RCENT OF GR	
				550	

Based upon Survey of India ma



# RAJASTHAN









ARABIAN

S E

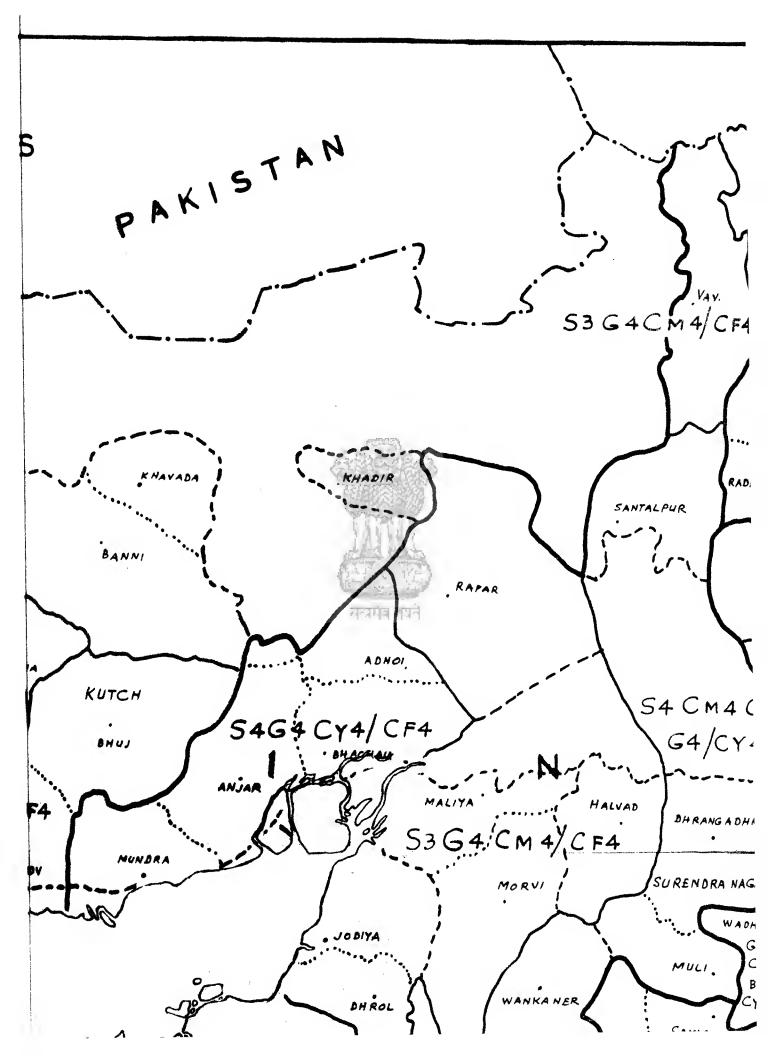
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The territorial wall measured from the



ARABIAN

SFA

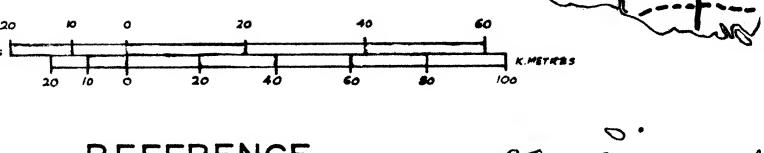


### LEGENU

LIVESTOCK	SYMBOLS
CATTLE :	
MALES OVER 3 YEARS	Cm
FEMALES OVER 3 YEARS	Cf .
YOUNGSTOCK 3 YEARS AND	UNDER CY
BUFFALOES:	
MALES OVER 3 YEARS	8m
FEMALES OVER 3 YEARS	<i>Bf</i>
YOUNG STOCK 3 YEARS AT	NO UNDER BY
SHEEP	s
GOATS	6
HOR SES PONIES	H
MULES	M
DONKEÝS	<b>D</b>
CAMELS	Can
CAMELS PIGS	Ca P
PIGS	
PIGS A DISTRIBUTION WHICH I	P
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS	P S THE SAME OVER TWO OR MORE
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE SES IS TO OR MORE AND THE TOTAL
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE SES IS TO OR MORE AND THE TOTAL
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PE	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE SES IS TO OR MORE AND THE TOTAL ER CENT.
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PE	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE HES IS TO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PI INTERVAL SUBSCRIPT	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE HES IS NO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PI INTERVAL SUBSCRIPT I	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE HES IS TO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK GREATER THAN TO
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PE INTERVAL SUBSCRIPT  I 2	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE SES IS TO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK GREATER THAN TO 50 - 70
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PI INTERVAL SUBSCRIPT  1 2 3	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE IES IS IO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK GREATER THAN TO 30 - 50
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PI INTERVAL SUBSCRIPT  1 2 3 4	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE SES IS TO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK GREATER THAN TO 30 - 50 10 - 30
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PI INTERVAL SUBSCRIPT  1 2 3 4 5	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE HES IS NO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK GREATER THAN TO 30 - 70 30 - 50 10 - 30 LESS THAN 10
PIGS A DISTRIBUTION WHICH IS ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PI INTERVAL SUBSCRIPT  1 2 3 4 5 EXAMPLE:	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE HES IS IO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK GREATER THAN TO 30 - 70 30 - 50 10 - 30 LESS THAN 10
PIGS A DISTRIBUTION WHICH I ADJOINING TALUKS IS OF INDIVIDUAL CATEGOR IS NOT LESS THAN TO PI INTERVAL SUBSCRIPT  1 2 3 4 5 EXAMPLE: LIVESTOCK PATTE	P S THE SAME OVER TWO OR MORE CALLED A PATTERN, IF THE %AGE SES IS TO OR MORE AND THE TOTAL ER CENT.  PERCENT OF TOTAL LIVE STOCK OF TALUK GREATER THAN TO 30 - 50 10 - 30 LESS THAN TO  RN CM3 S4 G4

Based upon Survey of India m

POR BANDA



# REFERENCE

INTERNATIONAL BOUNDARY

STATE BOUNDARY

DISTRICT BOUNDARY

TALUK BOUNDARY

ZON!

ZONE SUB-ZONE

SYMBOLS

Cm

C#

CY

Bf

5

6

8m प्रमान नगर्ने

# LEGEND

CATTLE :

MALES OVER 3 YEARS

FEMALES OVER 3 YEARS

YOUNGSTOCK 3 YEARS AND UNDER

BUFFALOES :

LIVESTOCK

MALES OVER 3 YEARS

FEMALES OVER 3 YEARS

YOUNG STOCK 3 YEARS AND UNDER BY

SHERP

GOATS

HOR SES PONIES H

MULES M
DONKEYS D

CAMELS Ca

PIGS

A DISTRIBUTION WHICH IS THE SAME OVER TWO OR MORE
ADJOINING TALUKS IS CALLED A PATTERN, IF THE %AGE
OF INDIVIOUAL CATEGORIES IS IO OR MORE AND THE TOTAL

IS NOT LESS THAN TO PER CENT.

EXAMPLE :

THAMANDAL, 54:CM4 CF4

POR BANDAR

# GUJARAT

LIVESTOCK PATTERNS

